How to create dashboard-"story" for highload

Anton Bystrov

++ High Load Armenia

Co-organizer

Yandex

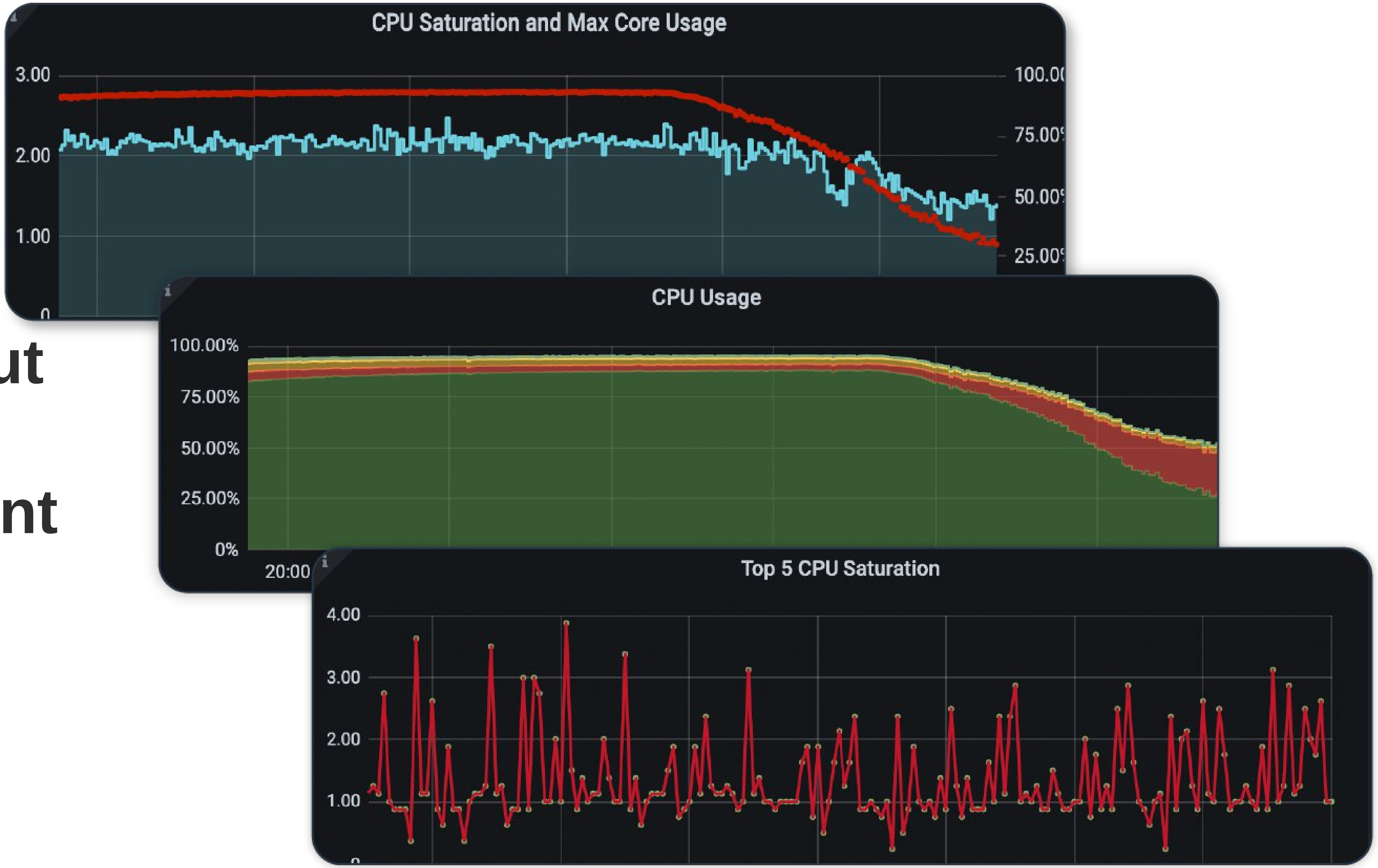
Who am I?

- Anton
- DevOps engineer
- I work with dashboards
- I debug metrics and something more...
- And like talking about monitoring ;)

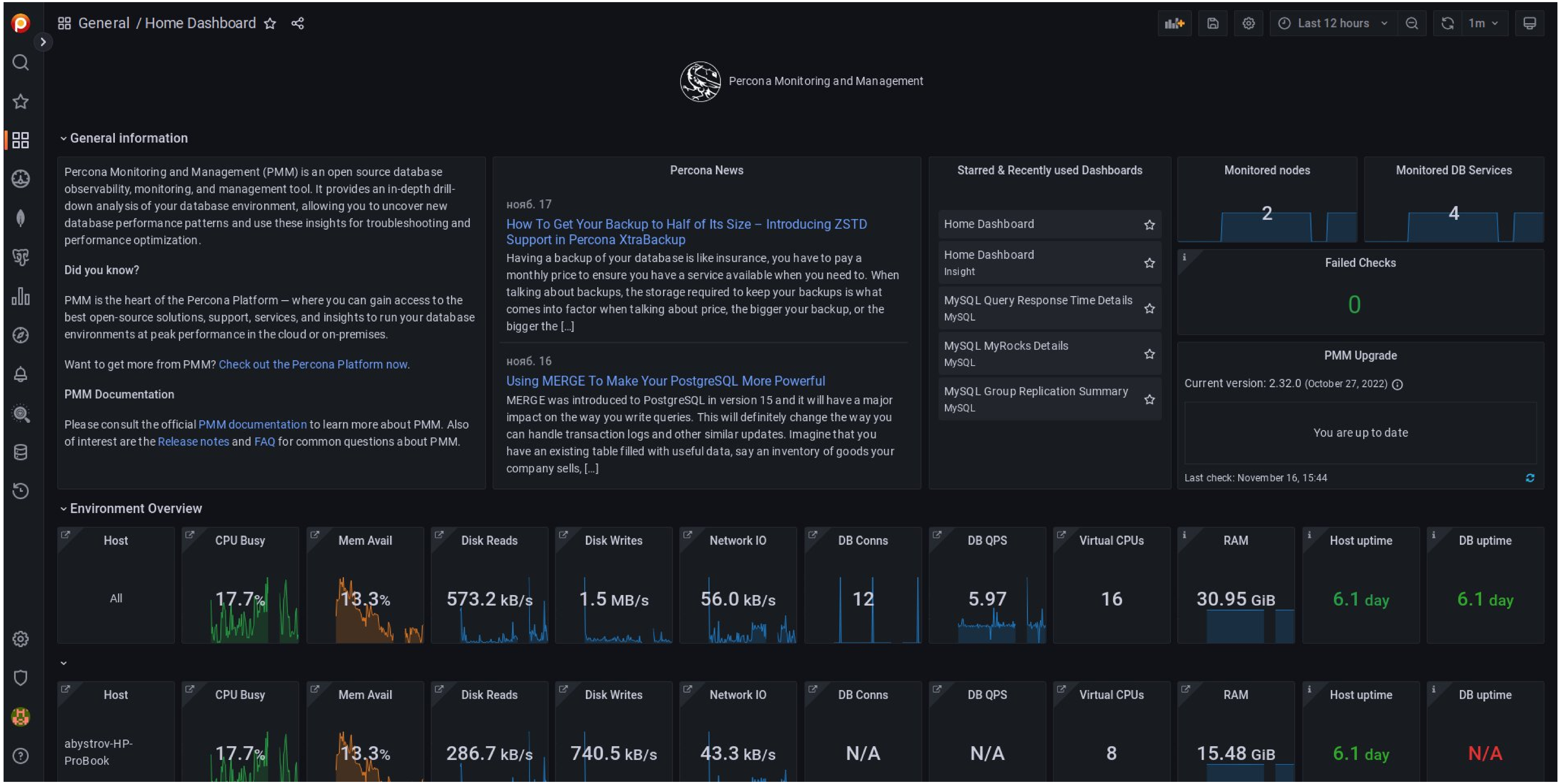
Профессиональная конференция
для разработчиков высоконагруженных
систем
Генеральный партнер
garage eight
#SaintHighLoad2022

Why is monitoring necessary?

- To know what happened
- It’s important to know about usage resources
- Statuses of each component in system
- Scrolling is not fun
- Let’s make it simple!



What do we monitor?



General / Home Dashboard

Last 12 hours · 1m

Percona Monitoring and Management

General information

Percona Monitoring and Management (PMM) is an open source database observability, monitoring, and management tool. It provides an in-depth drill-down analysis of your database environment, allowing you to uncover new database performance patterns and use these insights for troubleshooting and performance optimization.

Did you know?

PMM is the heart of the Percona Platform — where you can gain access to the best open-source solutions, support, services, and insights to run your database environments at peak performance in the cloud or on-premises.

Want to get more from PMM? Check out the Percona Platform now.

PMM Documentation

Please consult the official PMM documentation to learn more about PMM. Also of interest are the Release notes and FAQ for common questions about PMM.

Percona News

нояб. 17

How To Get Your Backup to Half of Its Size – Introducing ZSTD Support in Percona XtraBackup

Having a backup of your database is like insurance, you have to pay a monthly price to ensure you have a service available when you need to. When talking about backups, the storage required to keep your backups is what comes into factor when talking about price, the bigger your backup, or the bigger the [...]

нояб. 16

Using MERGE To Make Your PostgreSQL More Powerful

MERGE was introduced to PostgreSQL in version 15 and it will have a major impact on the way you write queries. This will definitely change the way you can handle transaction logs and other similar updates. Imagine that you have an existing table filled with useful data, say an inventory of goods your company sells, [...]

Starred & Recently used Dashboards

- Home Dashboard
- Home Dashboard — Insight
- MySQL Query Response Time Details — MySQL
- MySQL MyRocks Details — MySQL
- MySQL Group Replication Summary — MySQL

Monitored nodes	Monitored DB Services
2	4

Failed Checks

0

PMM Upgrade

Current version: 2.32.0 (October 27, 2022)

You are up to date

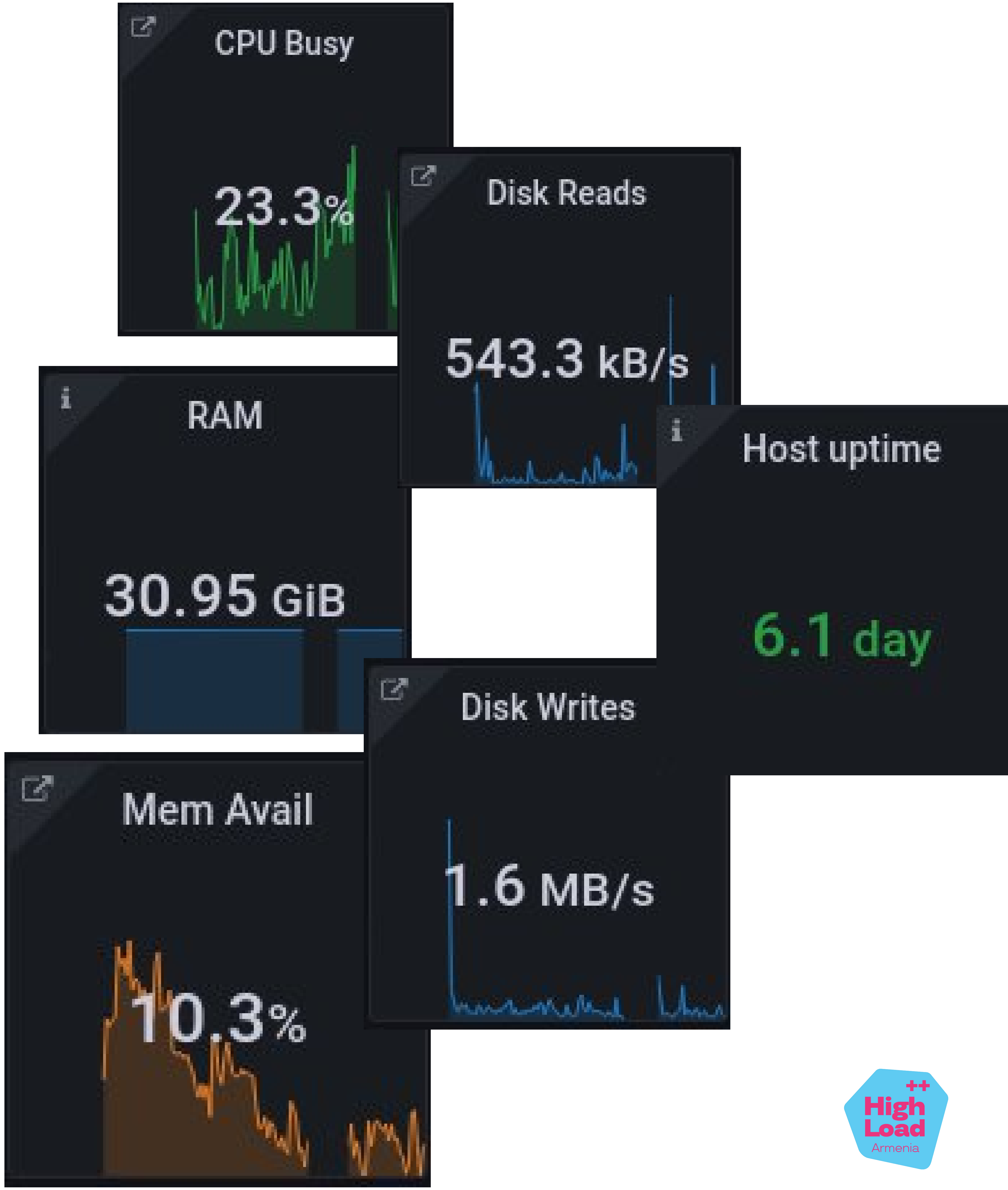
Last check: November 16, 15:44

Environment Overview

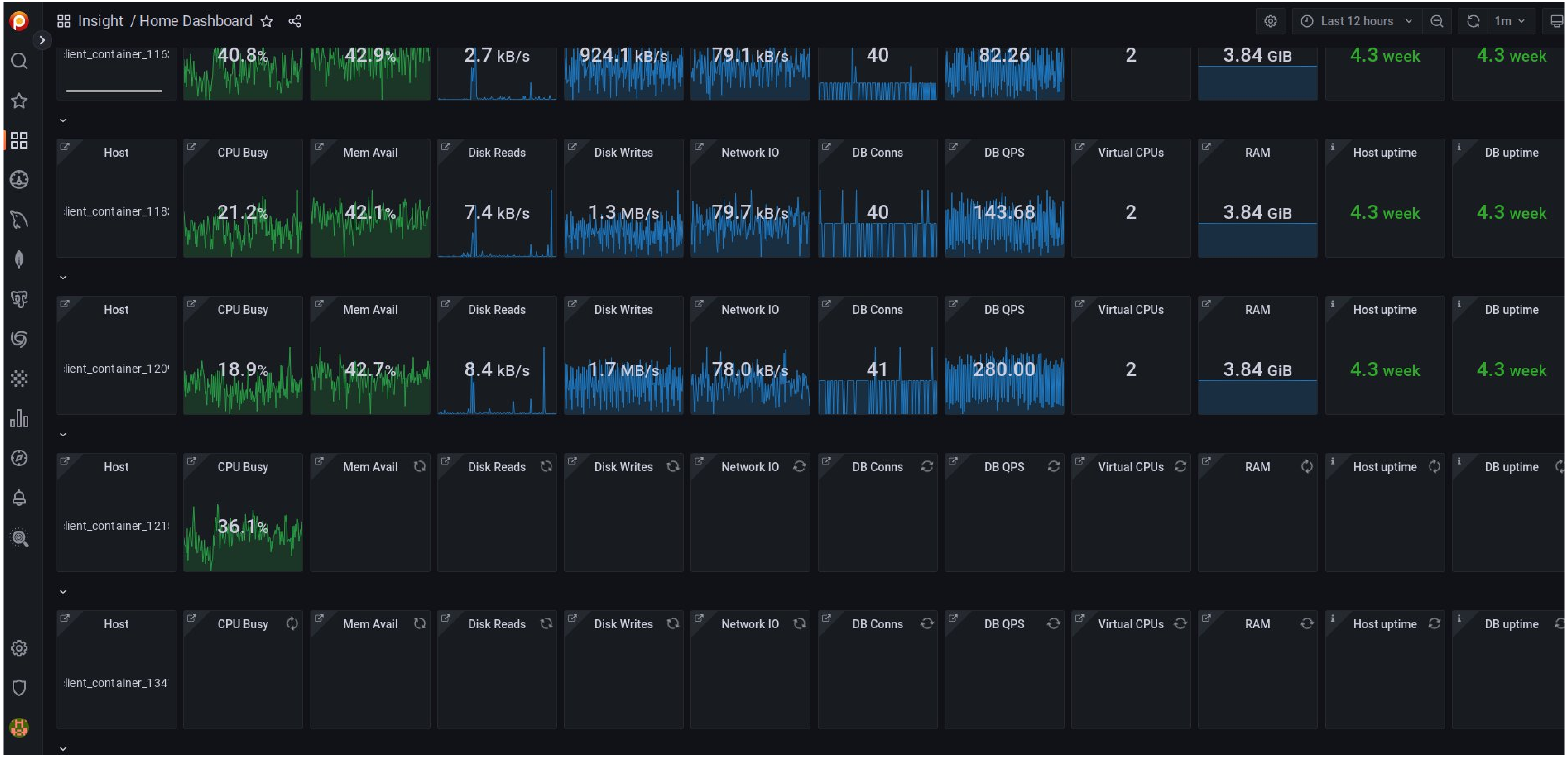
Host	CPU Busy	Mem Avail	Disk Reads	Disk Writes	Network IO	DB Conns	DB QPS	Virtual CPUs	RAM	Host uptime	DB uptime
All	17.7%	13.3%	573.2 kB/s	1.5 MB/s	56.0 kB/s	12	5.97	16	30.95 GiB	6.1 day	6.1 day
abystrov-HP-ProBook	17.7%	13.3%	286.7 kB/s	740.5 kB/s	43.3 kB/s	N/A	N/A	8	15.48 GiB	6.1 day	N/A

Key metrics

- CPU saturation
- Memory utilization
- I/O operations
- Uptime
- etc.



Wait a little bit more, please

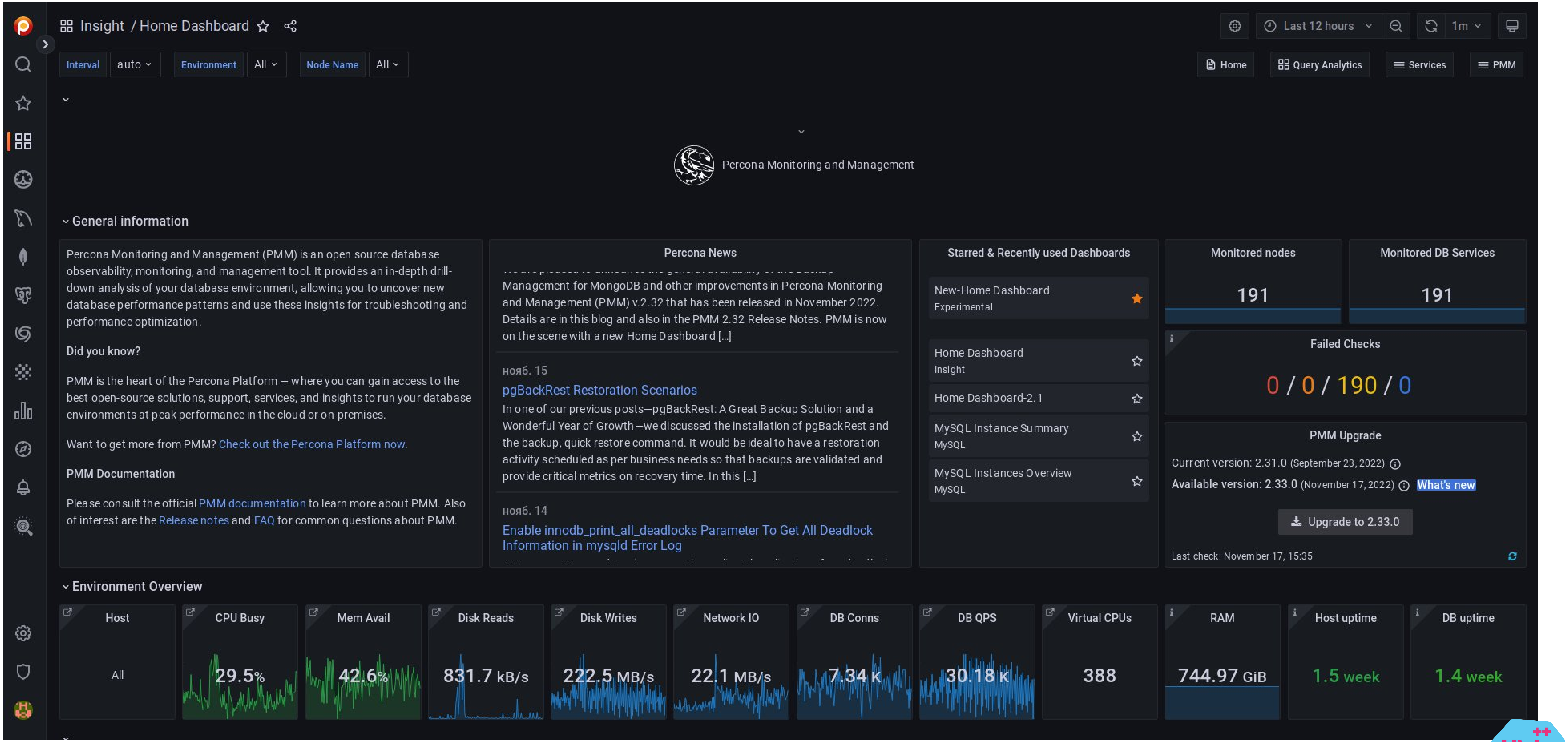


Insight / Home Dashboard

Last 12 hours · 1m

Host	CPU Busy	Mem Avail	Disk Reads	Disk Writes	Network IO	DB Conns	DB QPS	Virtual CPUs	RAM	Host uptime	DB uptime
lient_container_116	40.8%	42.9%	2.7 kB/s	924.1 kB/s	79.1 kB/s	40	82.26	2	3.84 GiB	4.3 week	4.3 week
lient_container_118	21.2%	42.1%	7.4 kB/s	1.3 MB/s	79.7 kB/s	40	143.68	2	3.84 GiB	4.3 week	4.3 week
lient_container_120	18.9%	42.7%	8.4 kB/s	1.7 MB/s	78.0 kB/s	41	280.00	2	3.84 GiB	4.3 week	4.3 week
lient_container_121	36.1%										
lient_container_134											

Need more ~~gold~~ nodes!!!



Insight / Home Dashboard

Last 12 hours · 1m

Interval: auto · Environment: All · Node Name: All

Home · Query Analytics · Services · PMM

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Want to get more from PMM? Check out the Percona Platform now.

PMM Documentation

Please consult the official PMM documentation to learn more about PMM. Also of interest are the Release notes and FAQ for common questions about PMM.

Percona News

We are pleased to announce the general availability of the Backup Management for MongoDB and other improvements in Percona Monitoring and Management (PMM) v.2.32 that has been released in November 2022. Details are in this blog and also in the PMM 2.32 Release Notes. PMM is now on the scene with a new Home Dashboard [...]

нояб. 15

pgBackRest Restoration Scenarios

In one of our previous posts—pgBackRest: A Great Backup Solution and a Wonderful Year of Growth—we discussed the installation of pgBackRest and the backup, quick restore command. It would be ideal to have a restoration activity scheduled as per business needs so that backups are validated and provide critical metrics on recovery time. In this [...]

нояб. 14

Enable innodb_print_all_deadlocks Parameter To Get All Deadlock Information in mysqld Error Log

Starred & Recently used Dashboards

- New-Home Dashboard — Experimental ★
- Home Dashboard — Insight ☆
- Home Dashboard-2.1 ☆
- MySQL Instance Summary — MySQL ☆
- MySQL Instances Overview — MySQL ☆

Monitored nodes: 191

Monitored DB Services: 191

Failed Checks: 0 / 0 / 190 / 0

PMM Upgrade

Current version: 2.31.0 (September 23, 2022)

Available version: 2.33.0 (November 17, 2022) What's new

Upgrade to 2.33.0

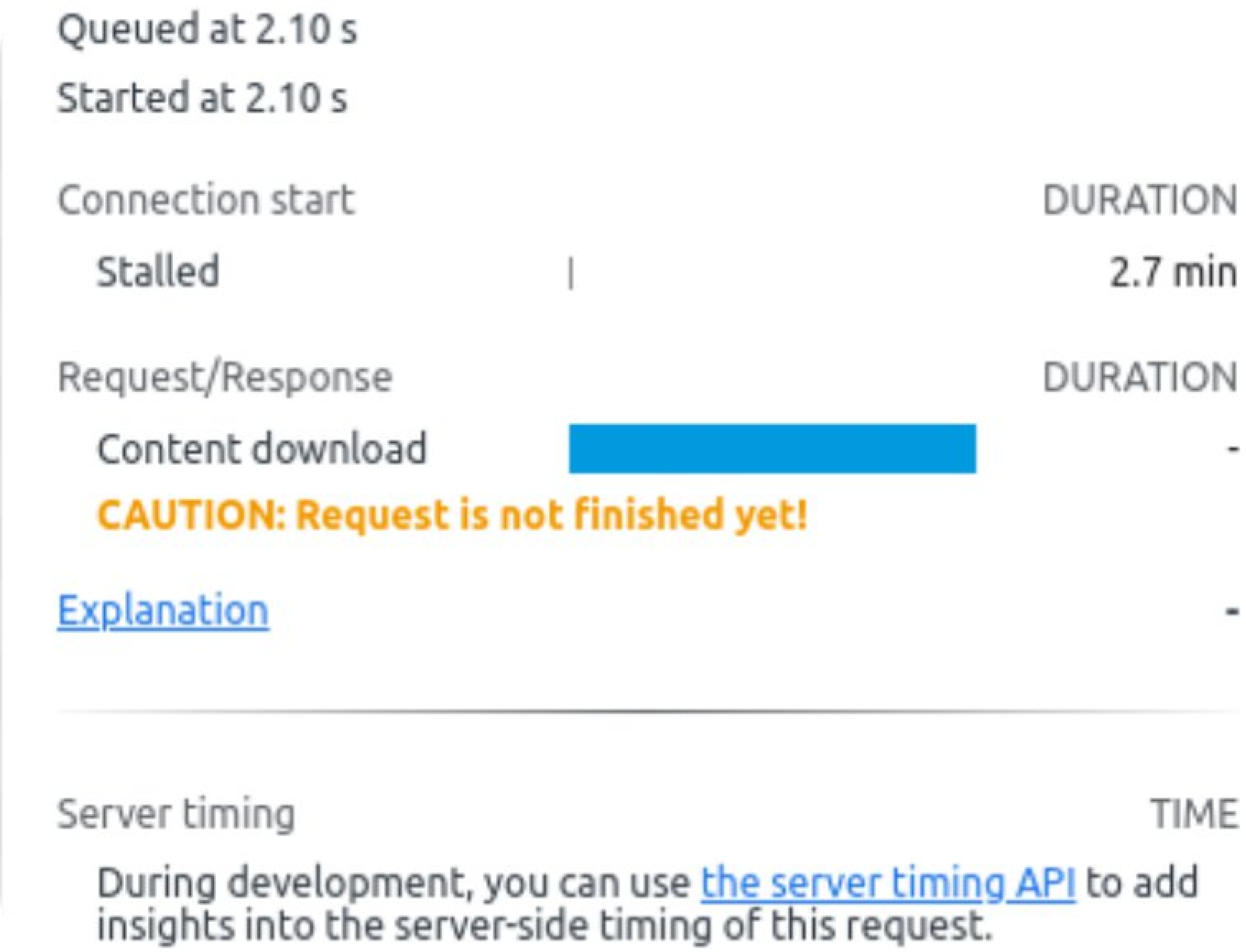
Last check: November 17, 15:35

Environment Overview

Host	CPU Busy	Mem Avail	Disk Reads	Disk Writes	Network IO	DB Conns	DB QPS	Virtual CPUs	RAM	Host uptime	DB uptime
All	29.5%	42.6%	831.7 kB/s	222.5 MB/s	22.1 MB/s	7.34 K	30.18 K	388	744.97 GiB	1.5 week	1.4 week

Loading time

- Loading time is more than 2 minutes!!!
- It’s necessary to know what happened
- It is crazy!



Queued at 2.10 s

Started at 2.10 s

Connection start	DURATION
Stalled	2.7 min

Request/Response	DURATION
Content download	-

CAUTION: Request is not finished yet!

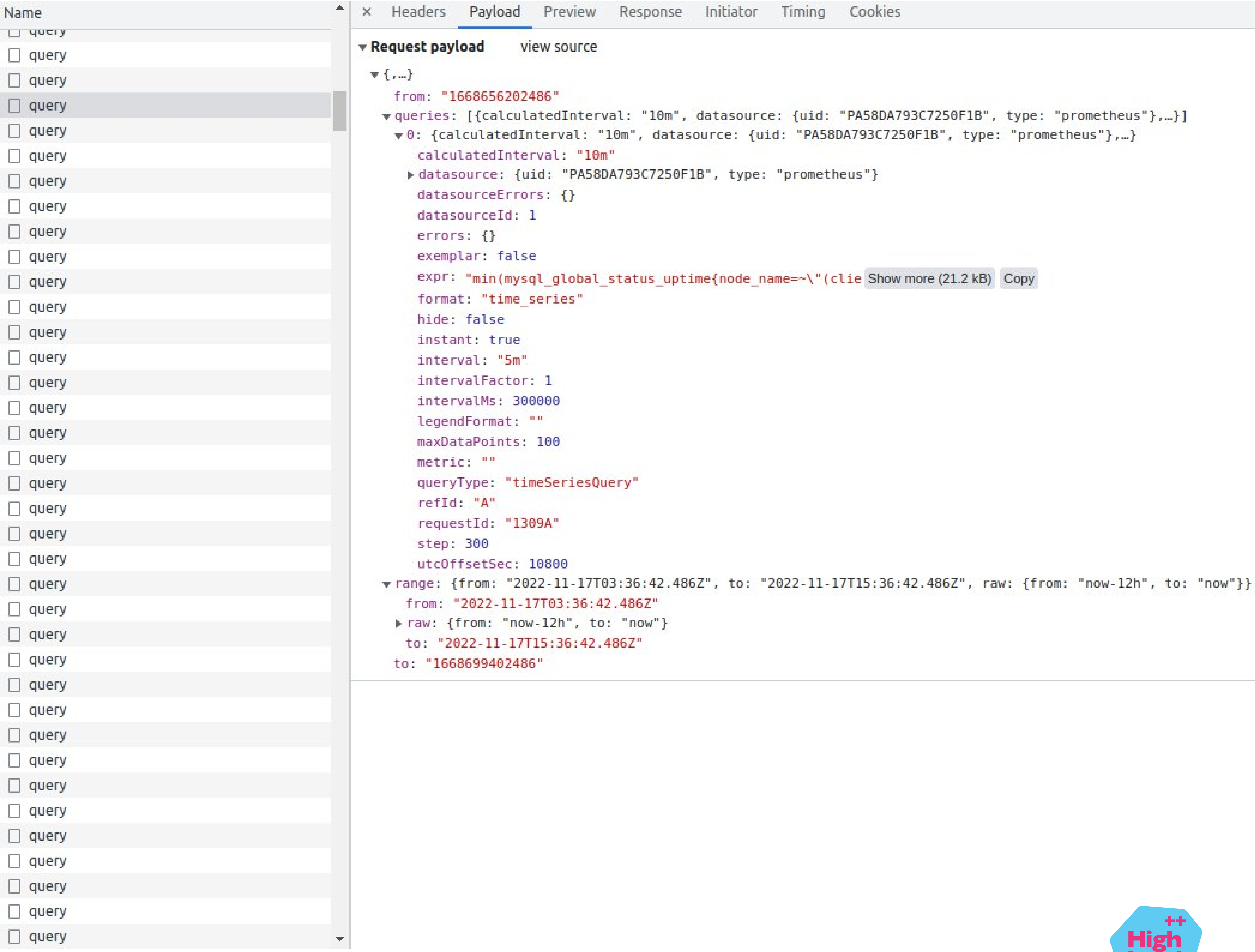
Explanation -

Server timing TIME

During development, you can use the server timing API to add insights into the server-side timing of this request.

Debugging

- Looking for longest request
- Requests from each panel take a lot of time
- Lazy load take a lot of time too



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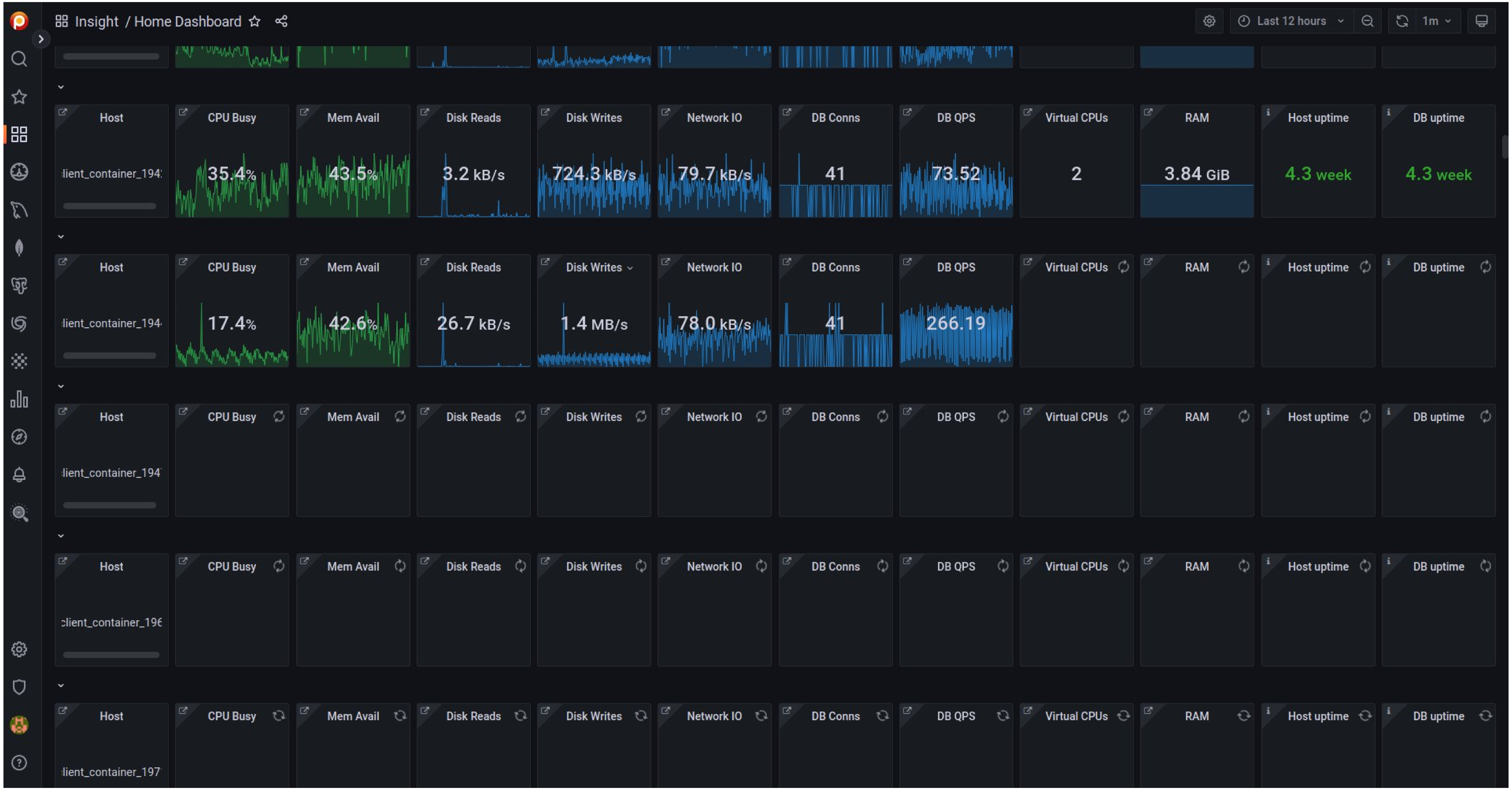
```

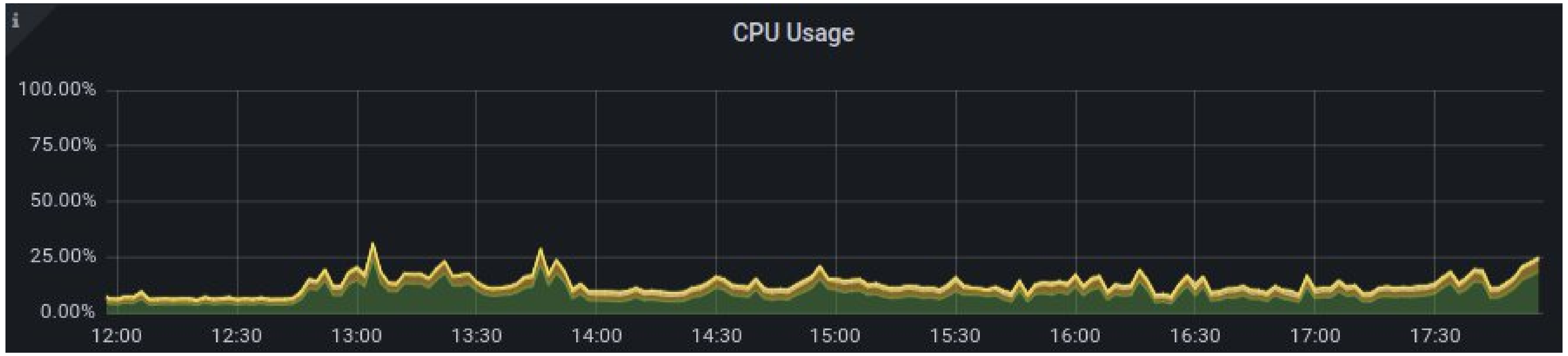
```
▼ Request payload      view source
 ▼ {,…}
    from: "1668656202486"
   ▼ queries: [{calculatedInterval: "10m", datasource: {uid: "PA58DA793C7250F1B", type: "prometheus"},…}]
    ▼ 0: {calculatedInterval: "10m", datasource: {uid: "PA58DA793C7250F1B", type: "prometheus"},…}
        calculatedInterval: "10m"
      ▶ datasource: {uid: "PA58DA793C7250F1B", type: "prometheus"}
        datasourceErrors: {}
        datasourceId: 1
        errors: {}
        exemplar: false
        expr: "min(mysql_global_status_uptime{node_name=~\"(clie Show more (21.2 kB) Copy
        format: "time_series"
        hide: false
        instant: true
        interval: "5m"
        intervalFactor: 1
        intervalMs: 300000
        legendFormat: ""
        maxDataPoints: 100
        metric: ""
        queryType: "timeSeriesQuery"
        refId: "A"
        requestId: "1309A"
        step: 300
        utcOffsetSec: 10800
   ▼ range: {from: "2022-11-17T03:36:42.486Z", to: "2022-11-17T15:36:42.486Z", raw: {from: "now-12h", to: "now"}}
      from: "2022-11-17T03:36:42.486Z"
     ▶ raw: {from: "now-12h", to: "now"}
      to: "2022-11-17T15:36:42.486Z"
    to: "1668699402486"
```

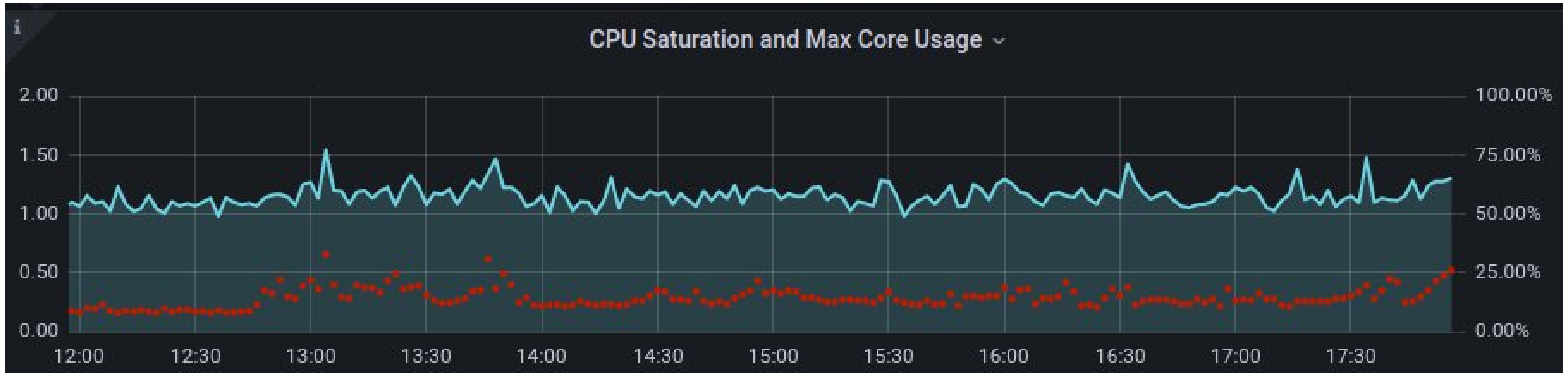
Lazy load loading

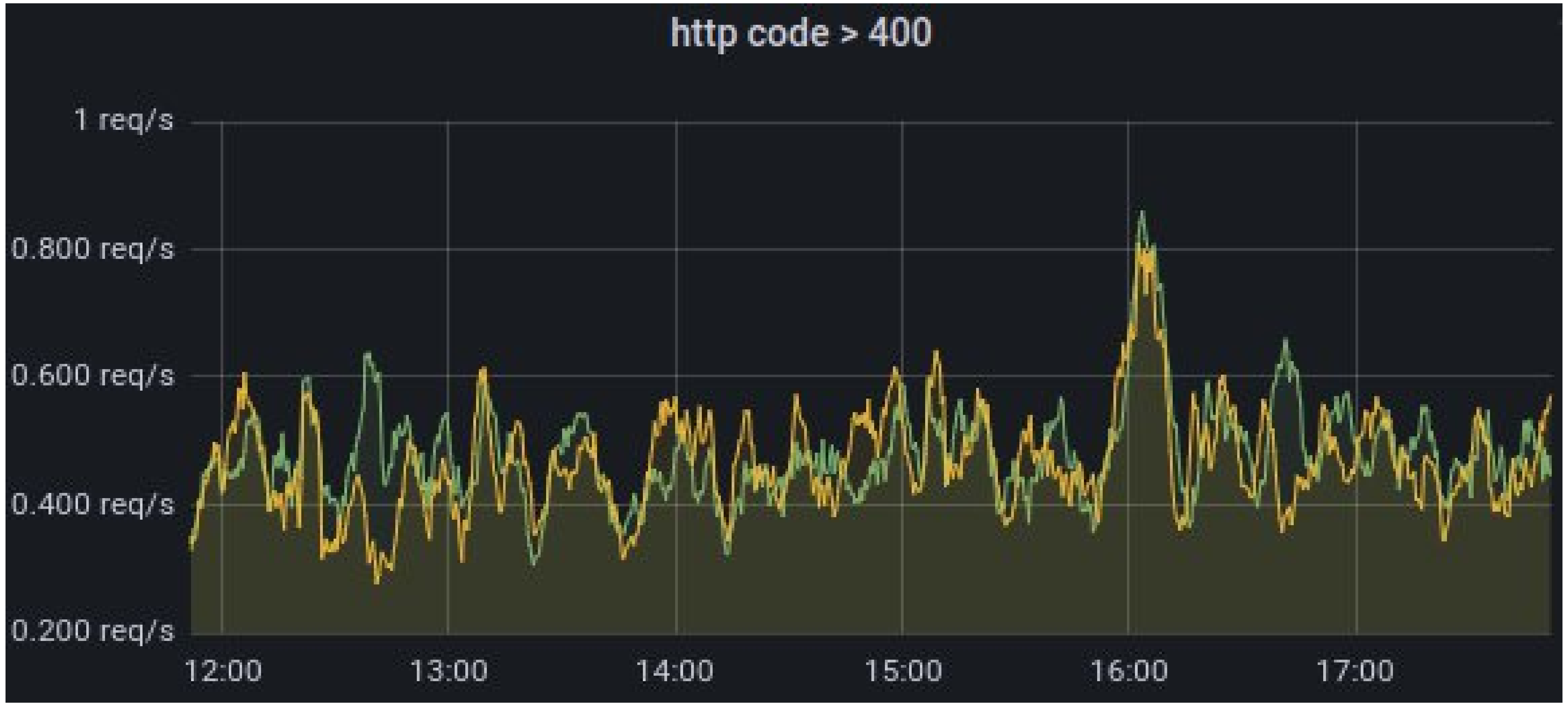


Host	CPU Busy	Mem Avail	Disk Reads	Disk Writes	Network IO	DB Conns	DB QPS	Virtual CPUs	RAM	Host uptime	DB uptime
lient_container_194	35.4%	43.5%	3.2 kB/s	724.3 kB/s	79.7 kB/s	41	73.52	2	3.84 GiB	4.3 week	4.3 week
lient_container_194	17.4%	42.6%	26.7 kB/s	1.4 MB/s	78.0 kB/s	41	266.19				
lient_container_194											
client_container_196											
lient_container_197											

USE, RED etc...

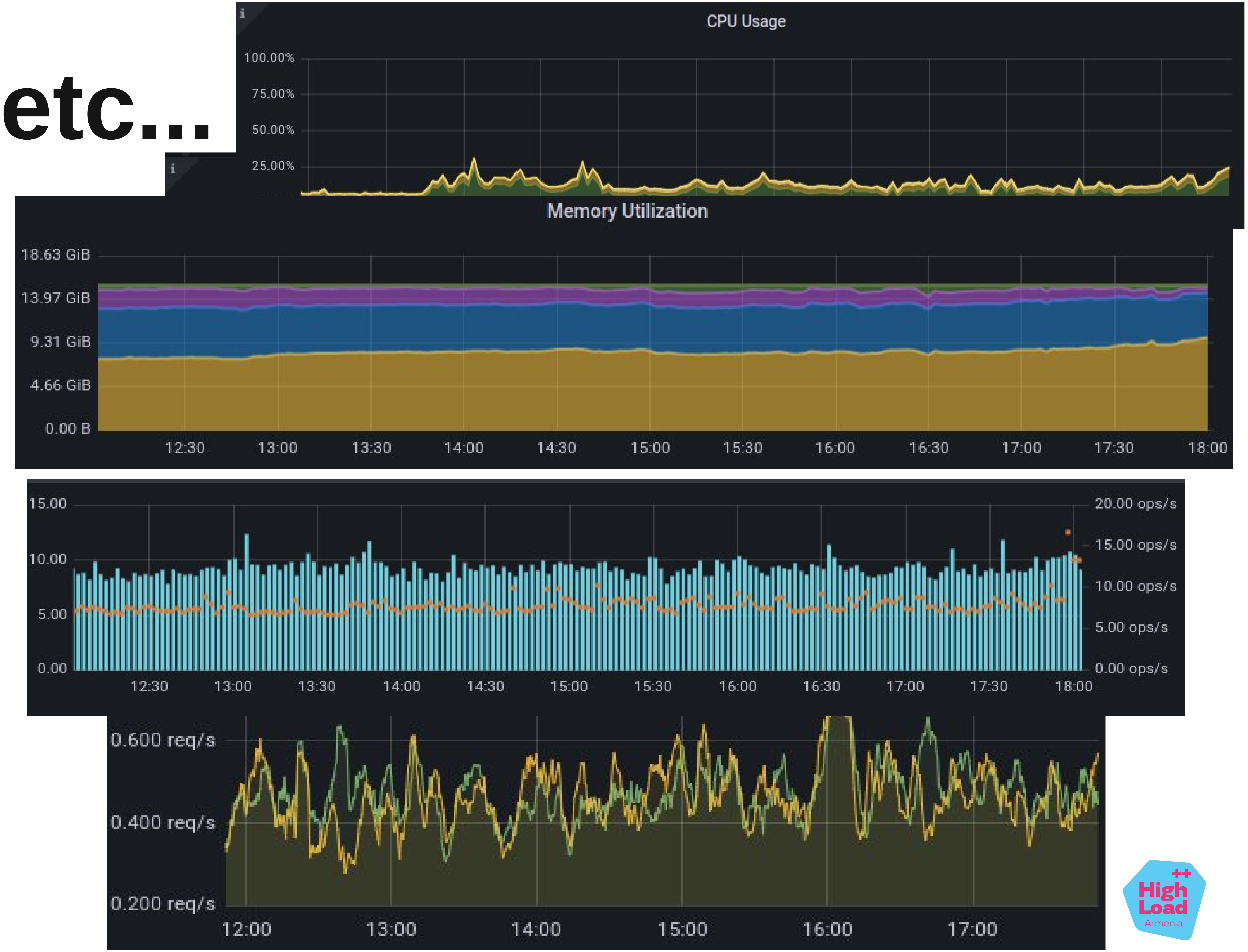






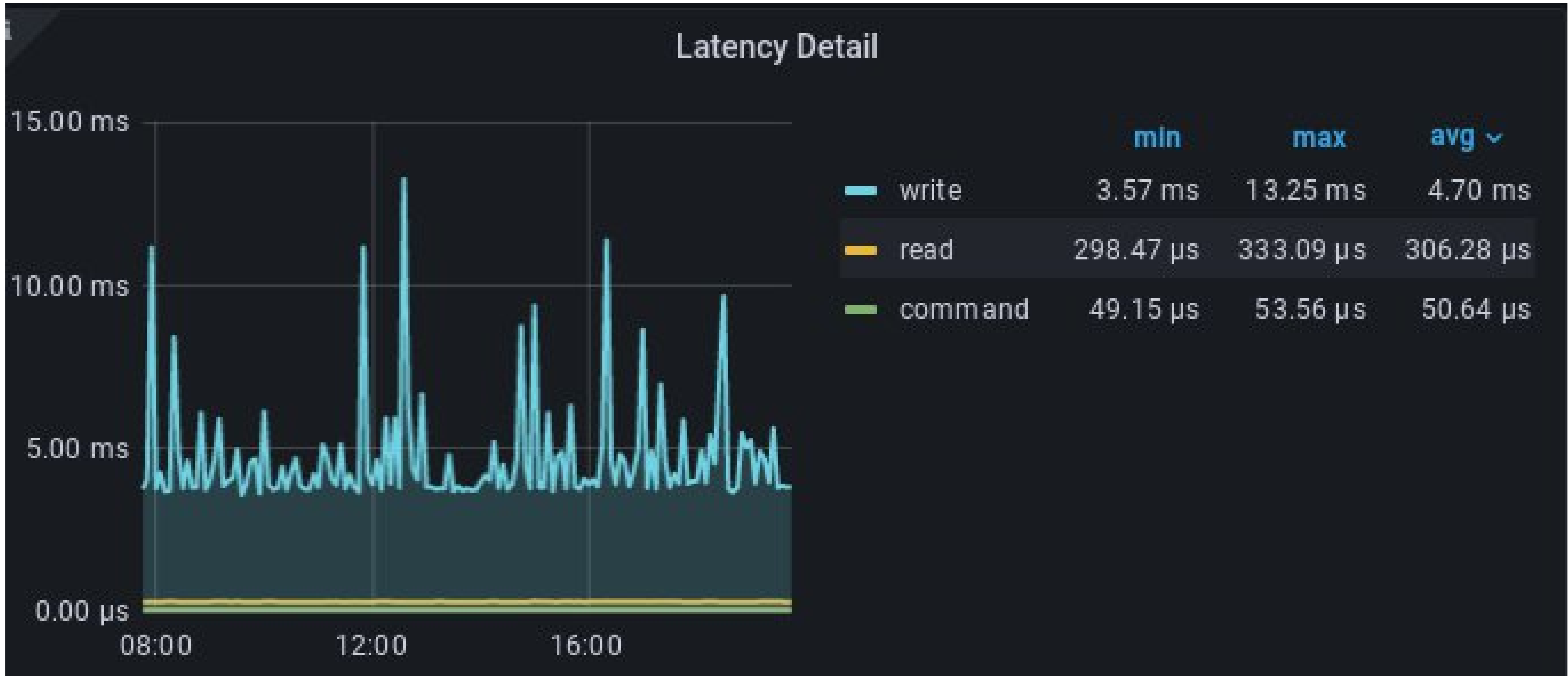
SimbirSoft, Percona

USE, RED etc...


CPU Usage
100.00%
75.00%
50.00%
25.00%
Memory Utilization
18.63 GiB
13.97 GiB
9.31 GiB
4.66 GiB
0.00 B
12:30
13:00
13:30
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
15.00
10.00
5.00
0.00
20.00 ops/s
15.00 ops/s
10.00 ops/s
5.00 ops/s
0.00 ops/s
12:30
13:00
13:30
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
0.600 req/s
0.400 req/s
0.200 req/s
12:00
13:00
14:00
15:00
16:00
17:00

Latency

- The time it takes to service a request
- Differences between successful and unsuccessful requests
- Slow error is even worse than a fast error

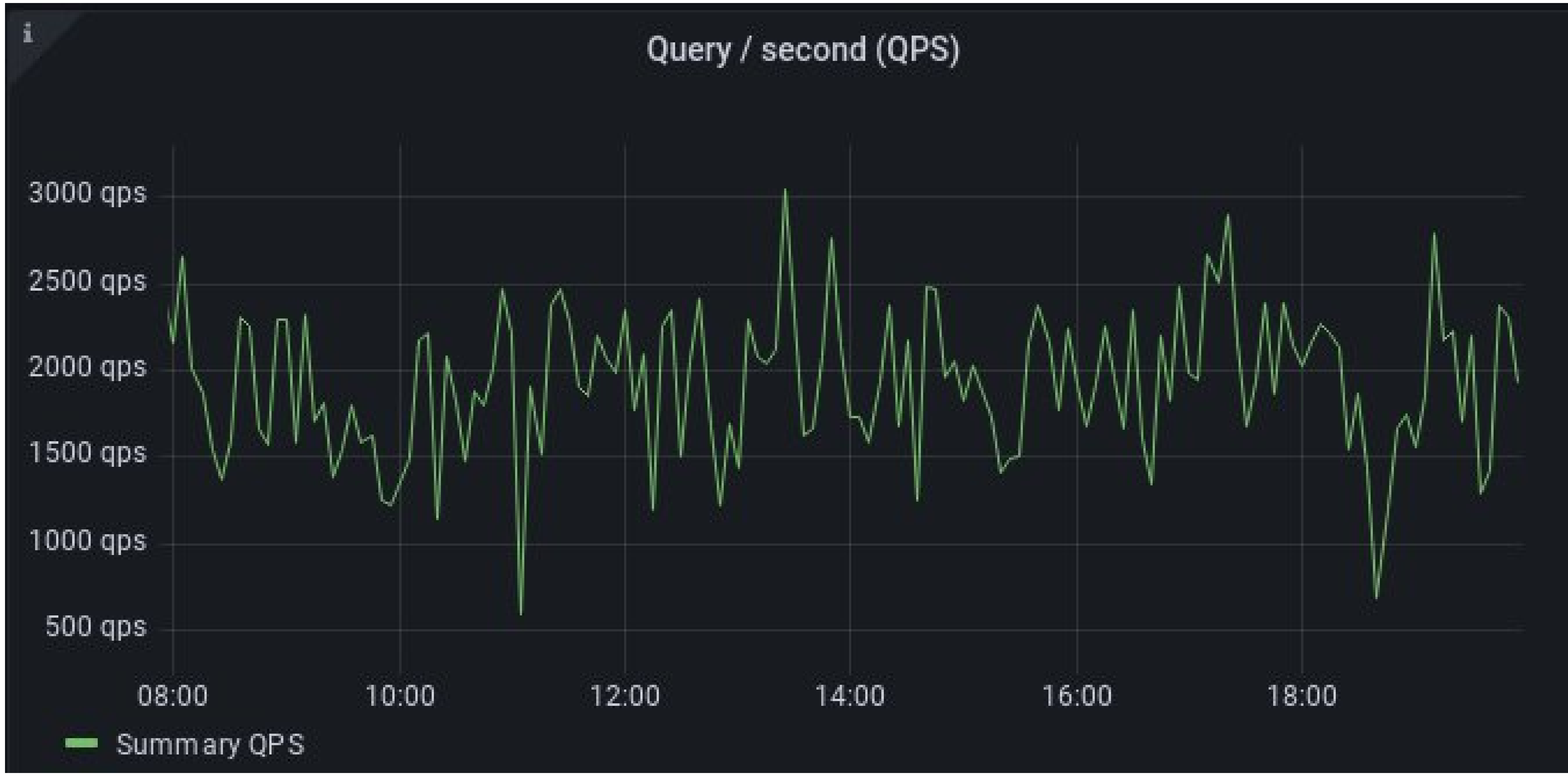


Latency Detail

	min	max	avg ⌄
write	3.57 ms	13.25 ms	4.70 ms
read	298.47 µs	333.09 µs	306.28 µs
command	49.15 µs	53.56 µs	50.64 µs

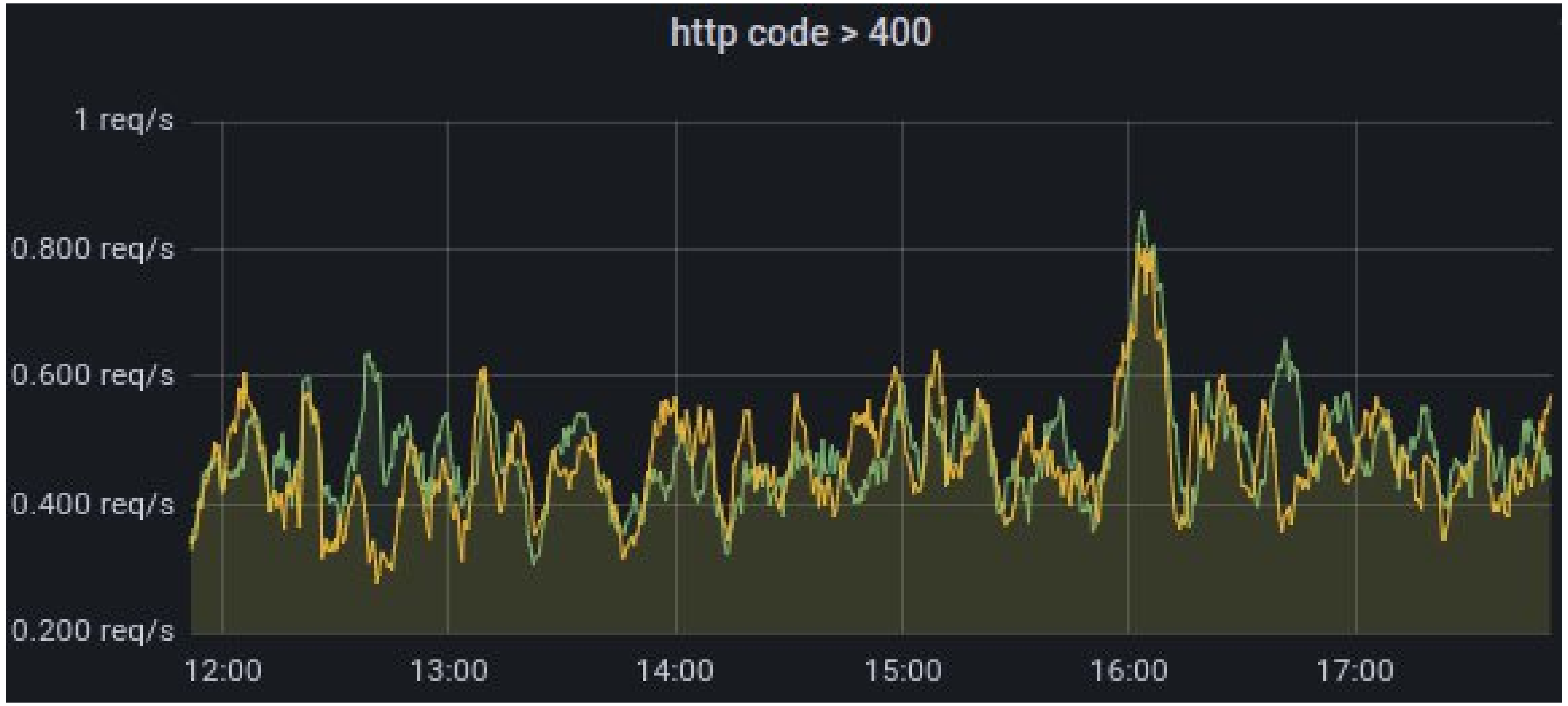
Traffic

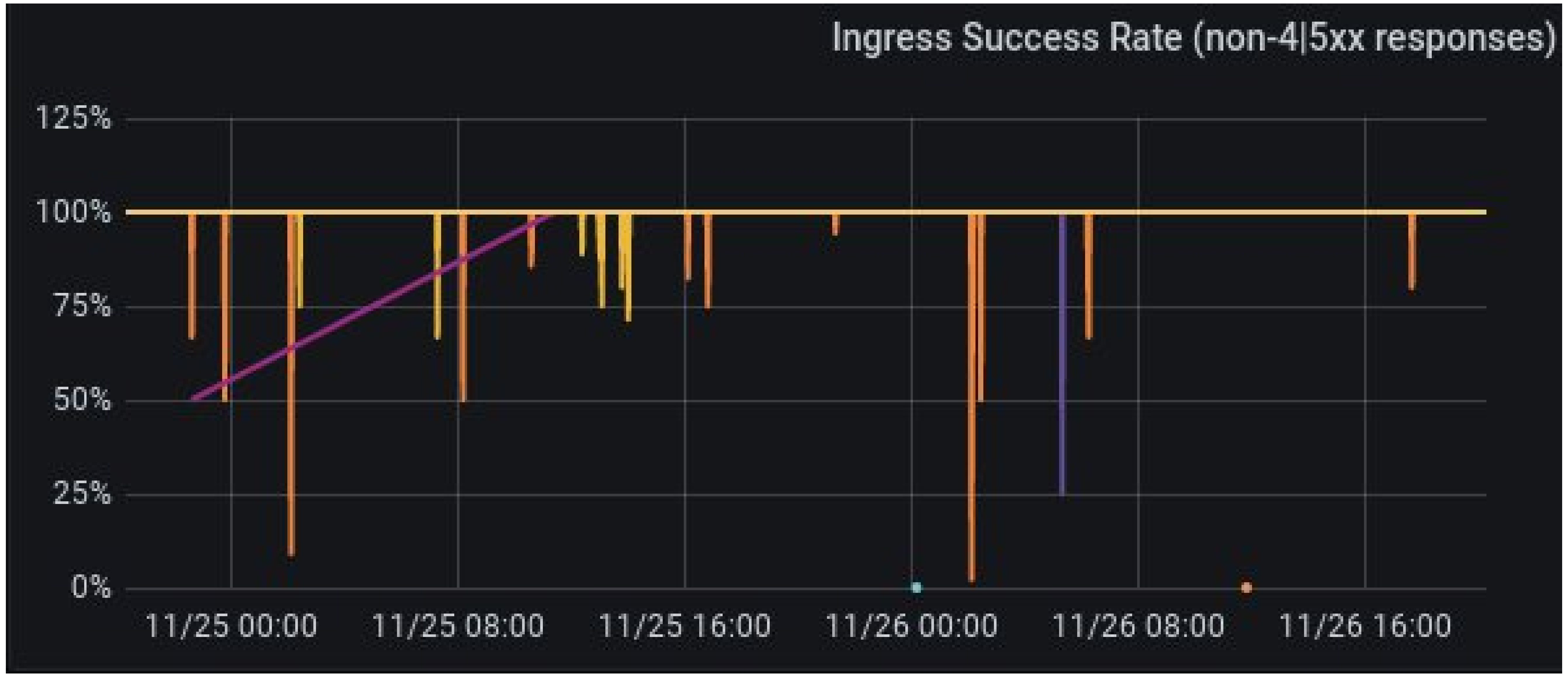
- How much demand is being placed on your system
- HTTP is requests per second
- Audio is I/O rate
- Key-value is transactions per second



Errors

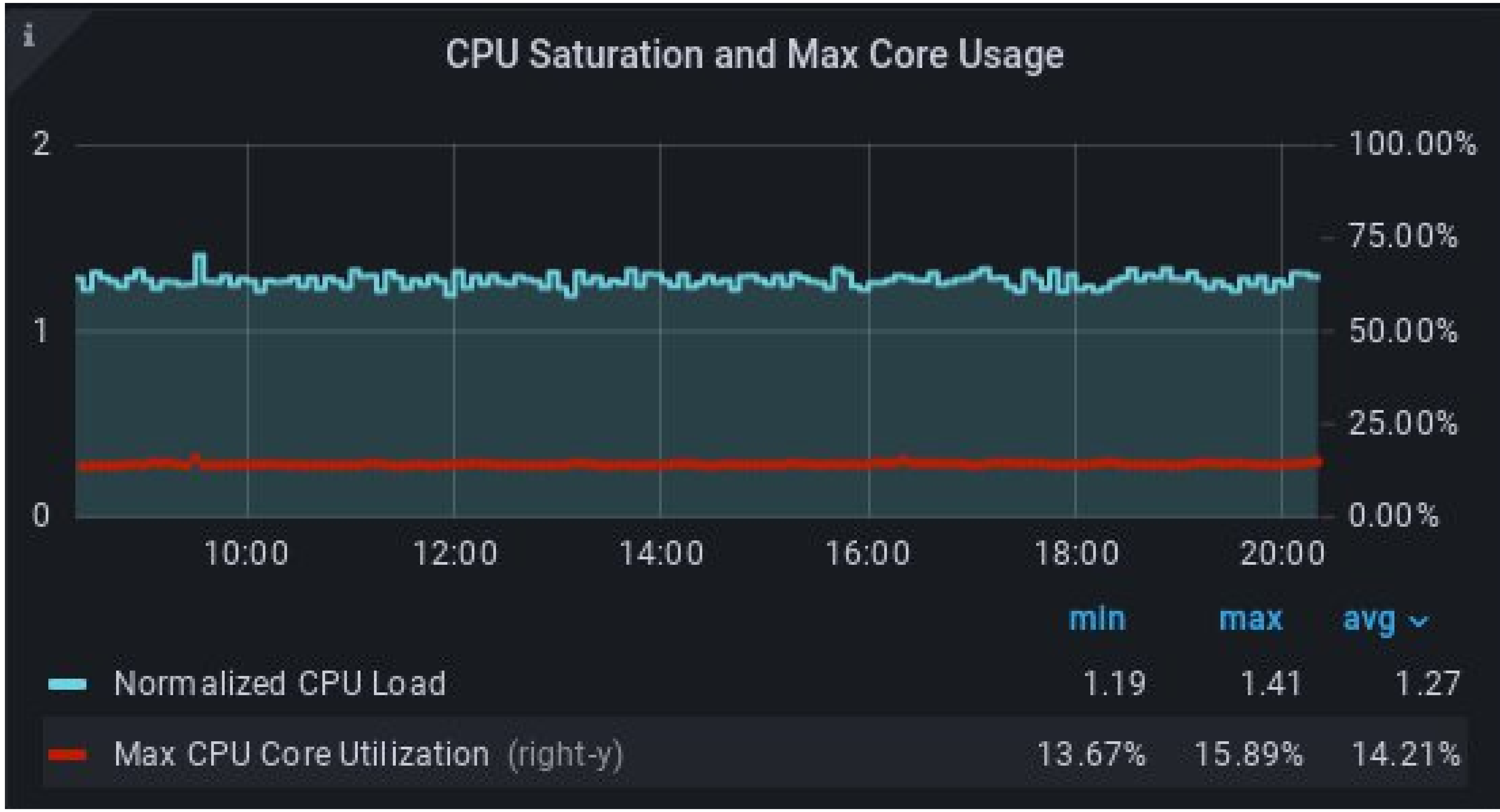
- Rate of requests that fail
- Either explicitly (HTTP 500)
- Implicitly (HTTP 200)
- Serving the wrong content





Saturations

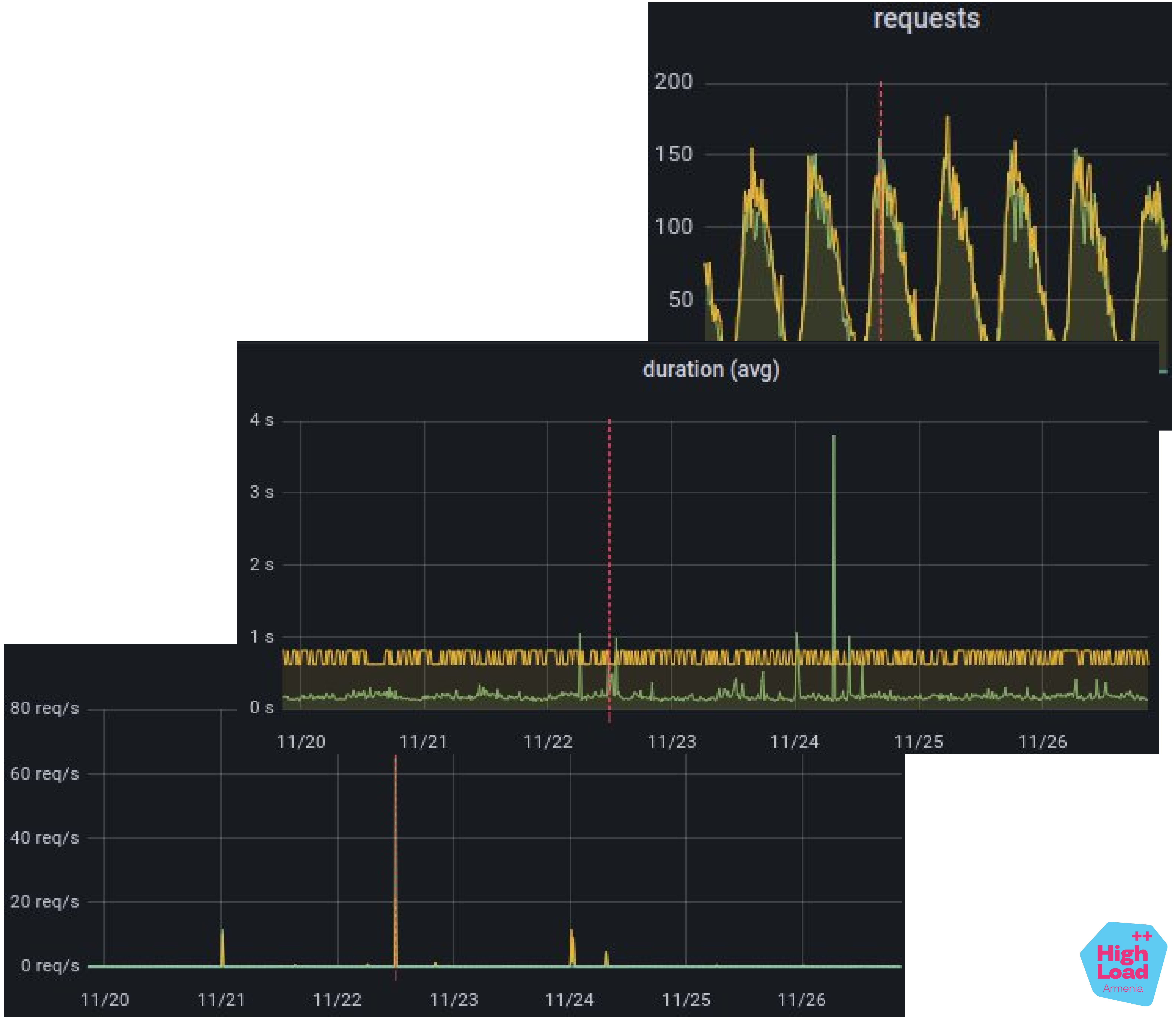
- How "full" your service is
- A measure of your system fraction, emphasizing the resources that are most constrained
- Many systems degrade in performance before they achieve 100% utilization



	min	max	avg
Normalized CPU Load	1.19	1.41	1.27
Max CPU Core Utilization (right-y)	13.67%	15.89%	14.21%

RED

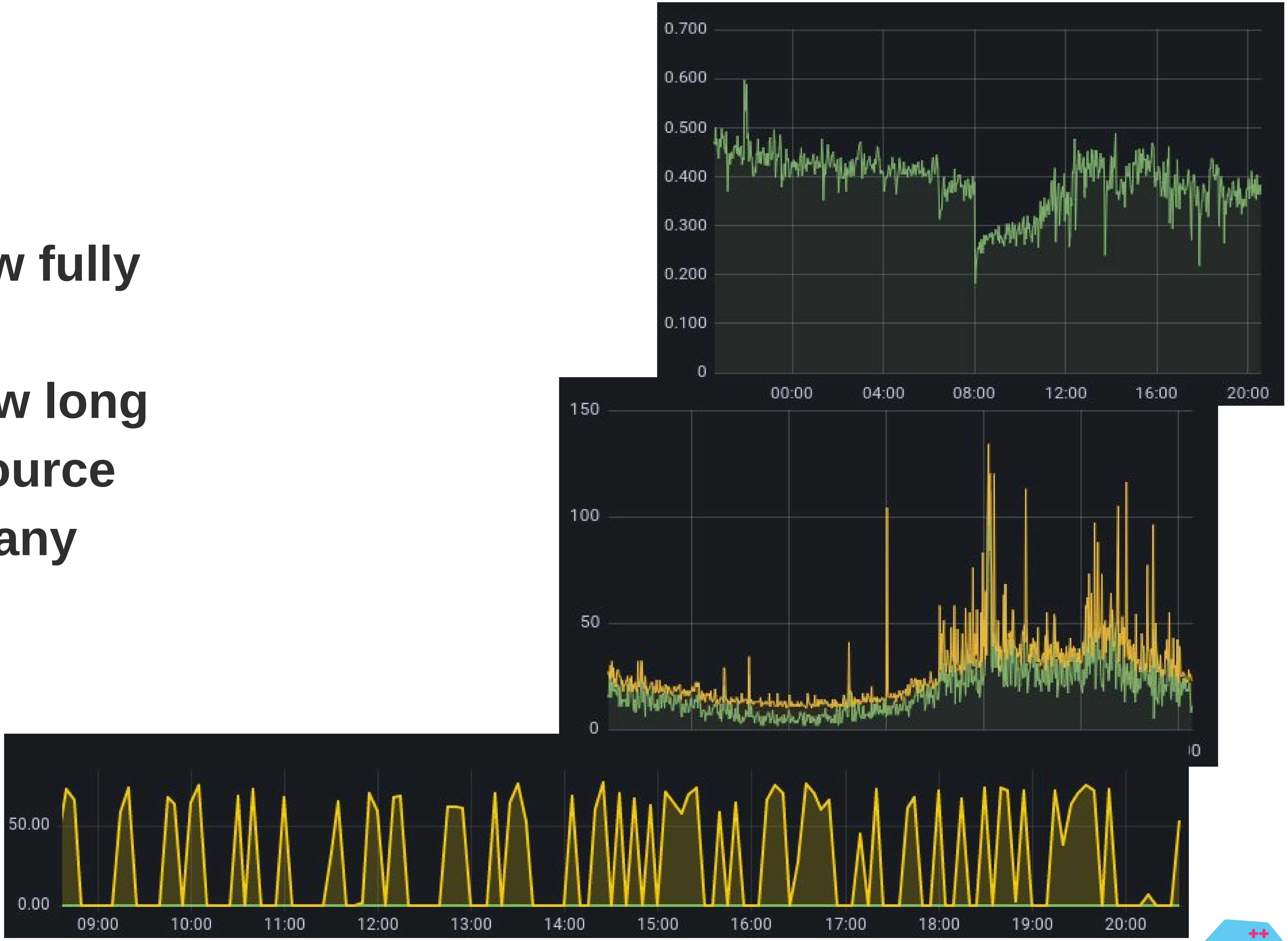
- R - rate, request per second
- E - errors, how many requests return error
- D - duration, latency, the time it takes to request



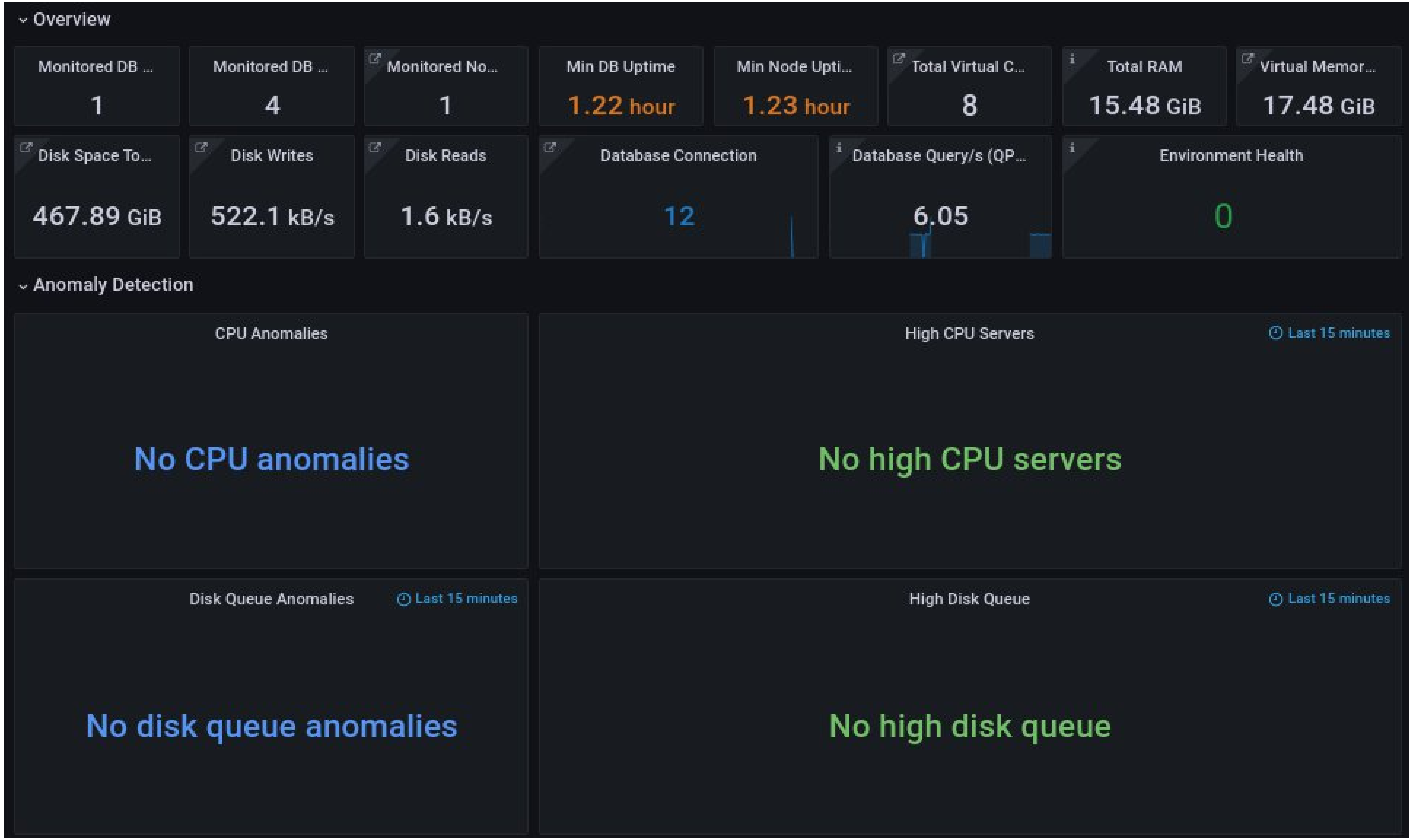
SimbirSoft, Percona

USE

- U - utilization, how fully resource work
- S - saturation, how long queue at this resource
- E - errors, how many errors we have



POC of Home Dashboard



⌄ Overview

Monitored DB ...
1

Monitored DB ...
4

Monitored No...
1

Min DB Uptime
1.22 hour

Min Node Upti...
1.23 hour

Total Virtual C...
8

Total RAM
15.48 GiB

Virtual Memor...
17.48 GiB

Disk Space To...
467.89 GiB

Disk Writes
522.1 kB/s

Disk Reads
1.6 kB/s

Database Connection
12

Database Query/s (QP...
6.05

Environment Health
0

⌄ Anomaly Detection

CPU Anomalies

No CPU anomalies

High CPU Servers — Last 15 minutes

No high CPU servers

Disk Queue Anomalies — Last 15 minutes

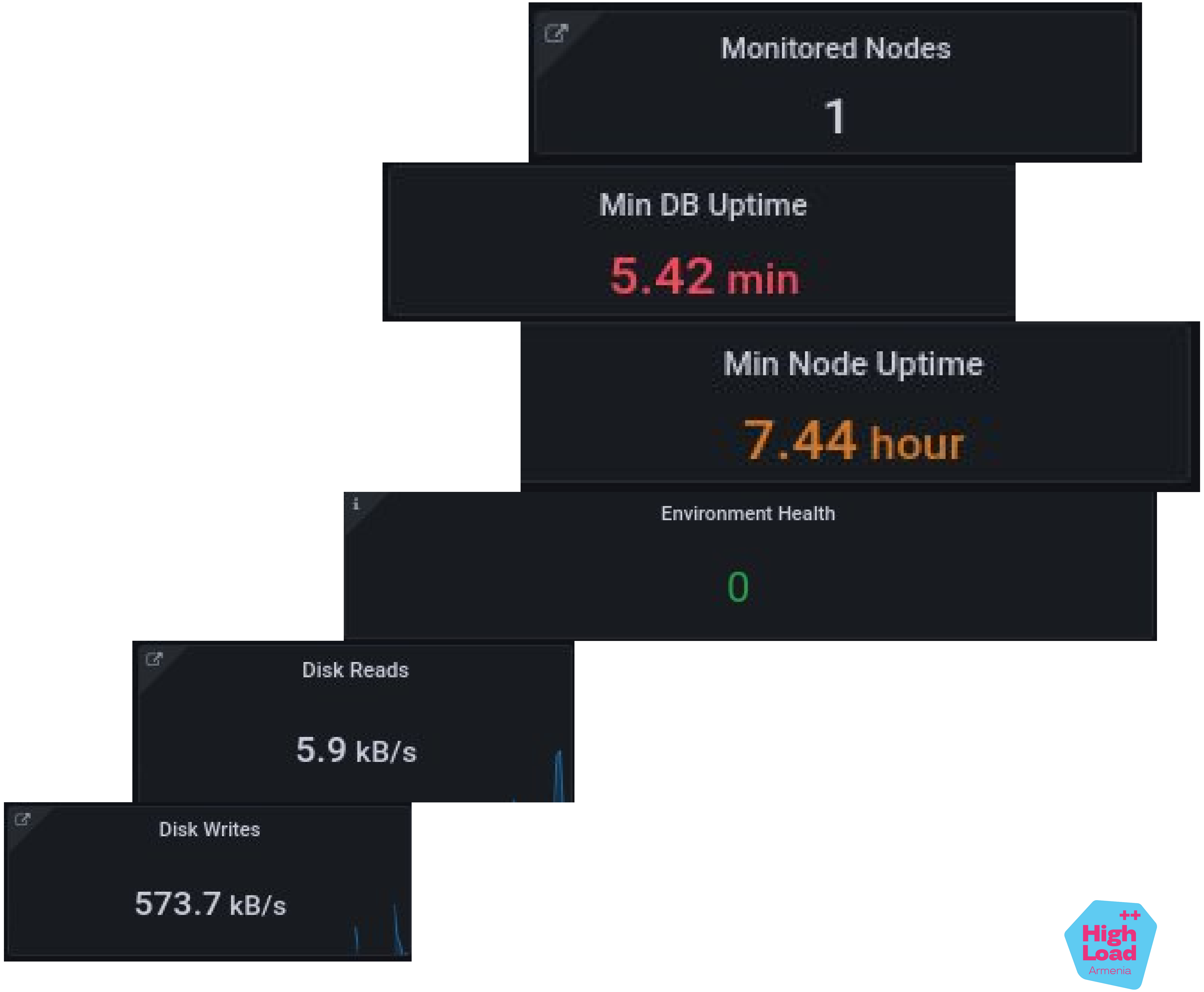
No disk queue anomalies

High Disk Queue — Last 15 minutes

No high disk queue

Overview row

- How many nodes do we have?
- Disk operations
- DB and node uptime
- Advisors checks



Monitored Nodes

1

Min DB Uptime

5.42 min

Min Node Uptime

7.44 hour

Environment Health

0

Disk Reads

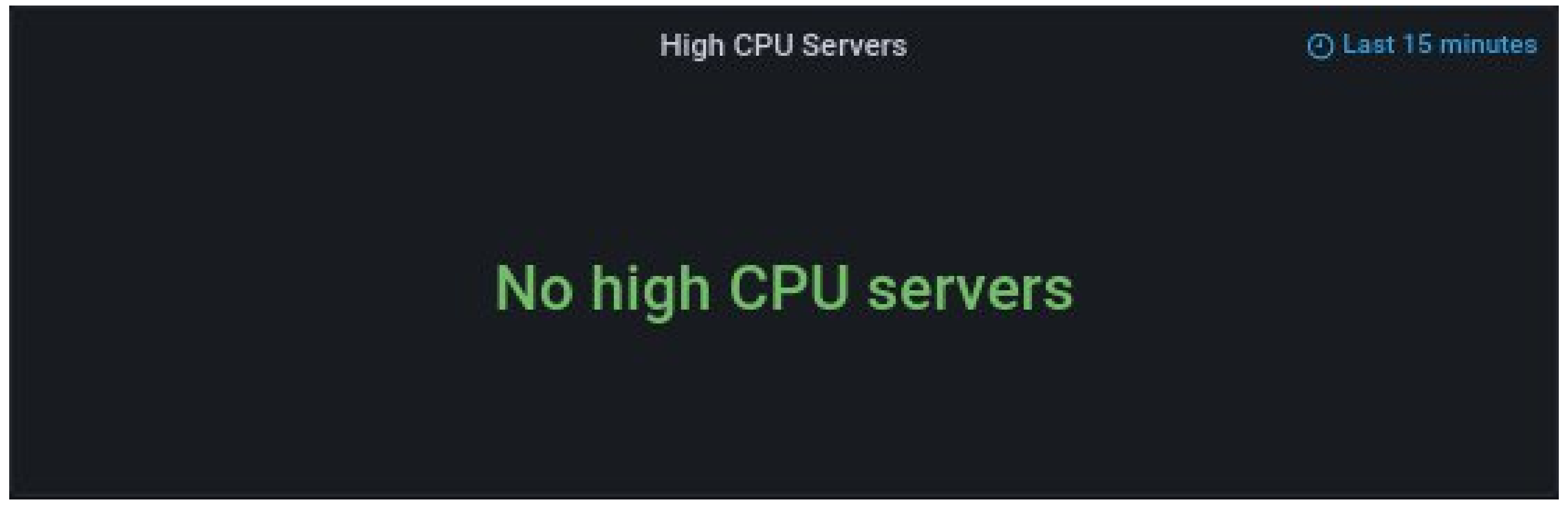
5.9 kB/s

Disk Writes

573.7 kB/s

Anomaly detection

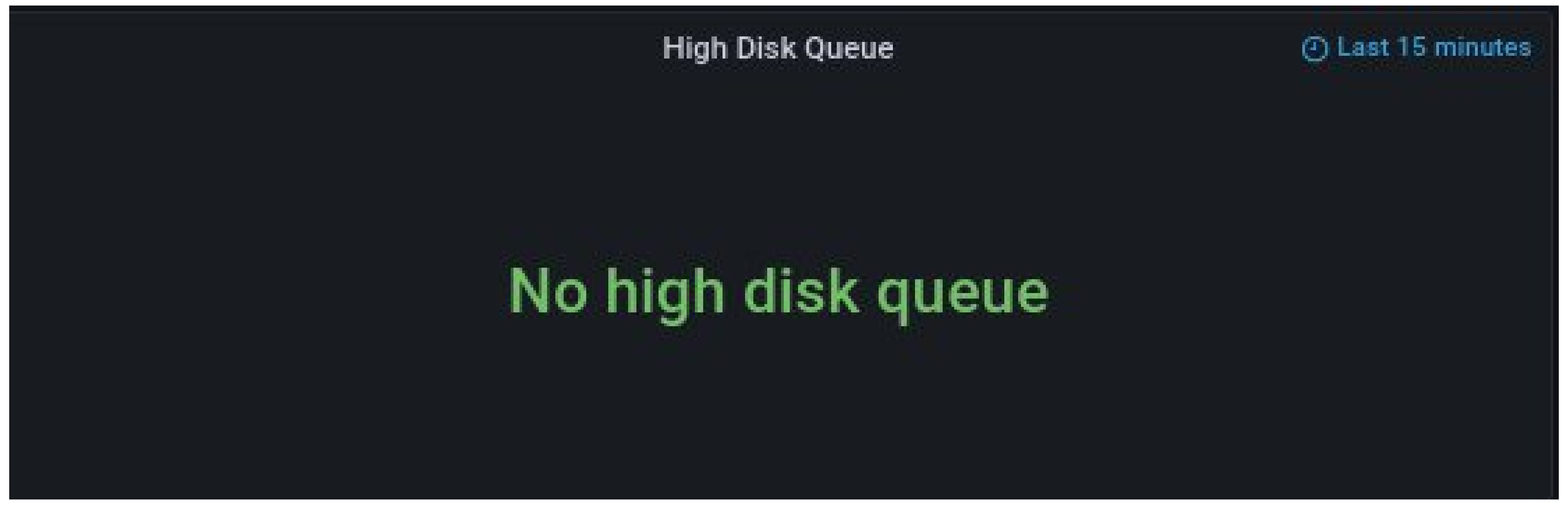
- CPU and Disk metrics
- How fully do we use our resources?
- Comparison with previous week



High CPU Servers

Last 15 minutes

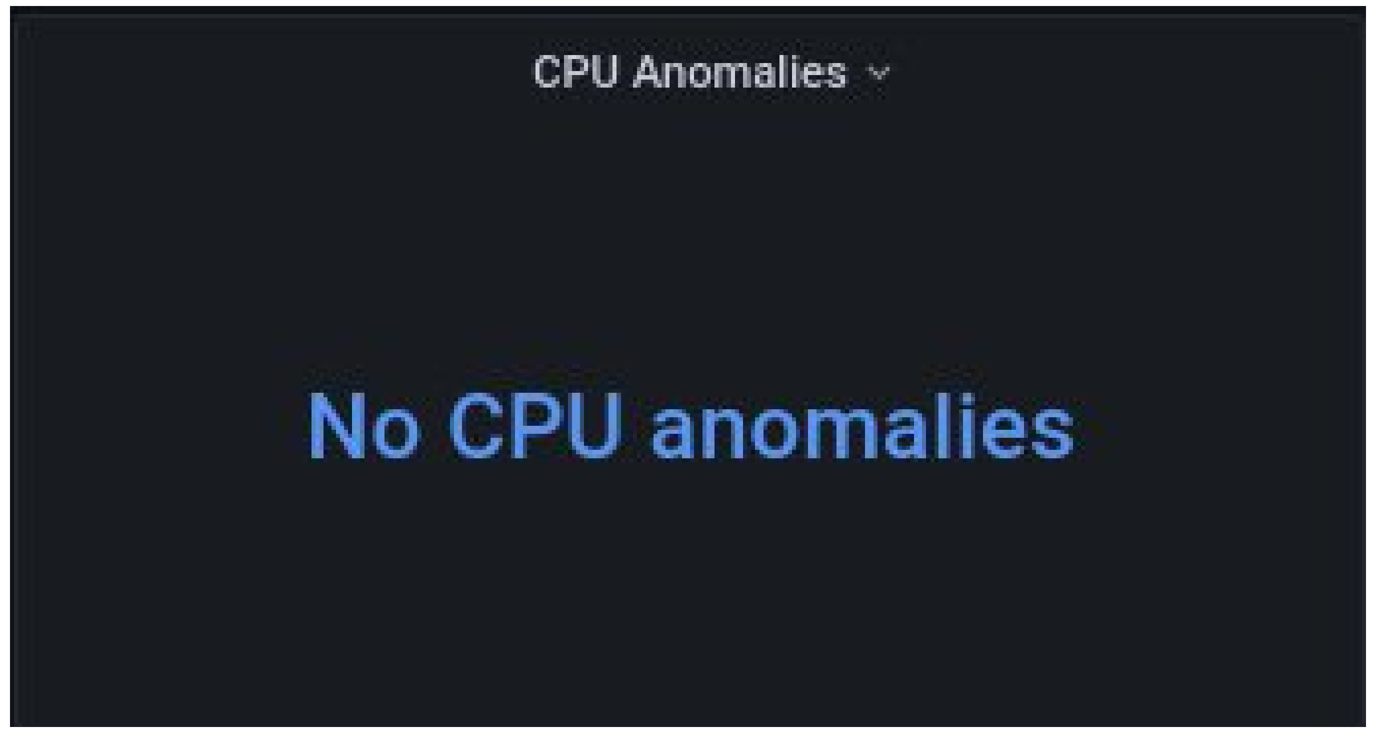
No high CPU servers



High Disk Queue

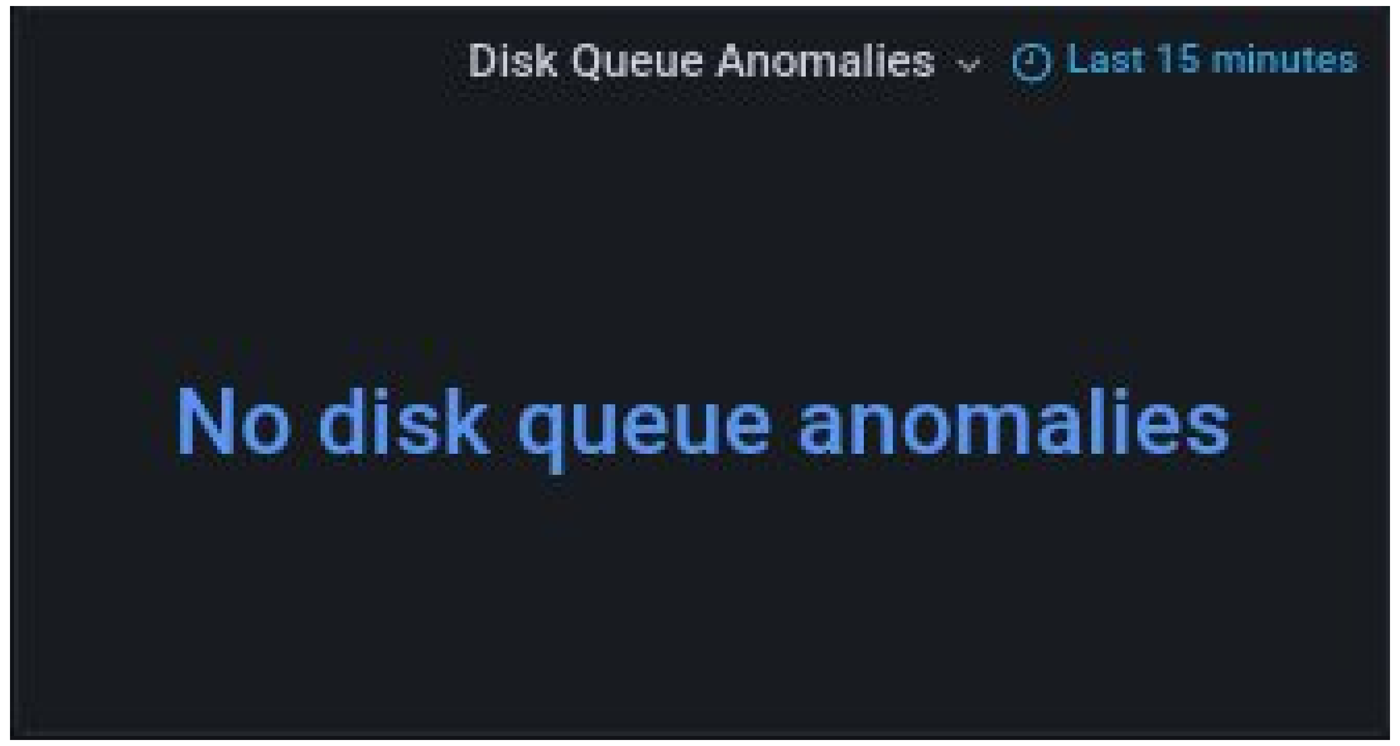
Last 15 minutes

No high disk queue



CPU Anomalies

No CPU anomalies



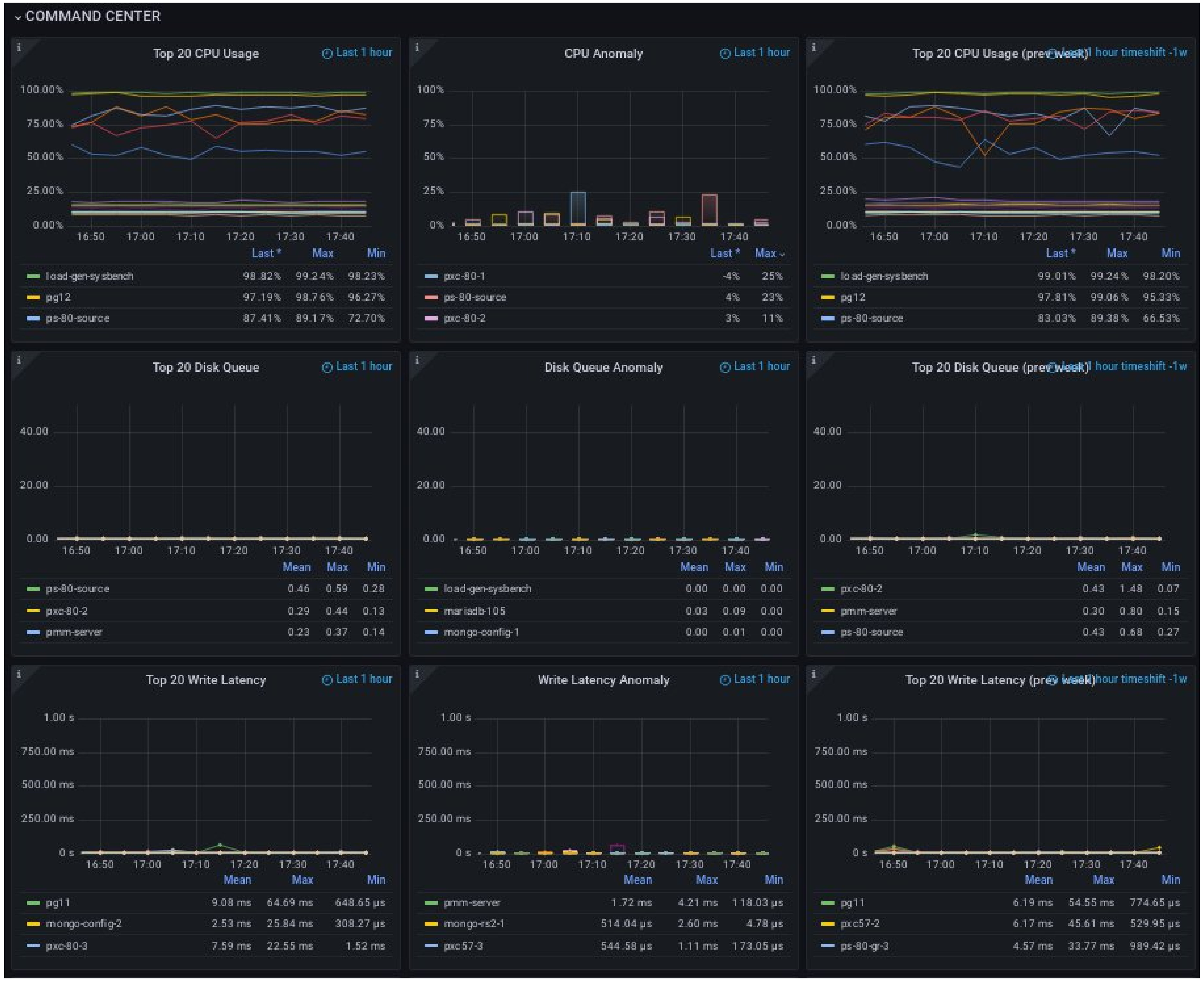
Disk Queue Anomalies

Last 15 minutes

No disk queue anomalies

Command center

- What’s wrong in our system?
- How fully do we use our resources?
- What was one week ago?



Top 20 CPU Usage — Last 1 hour

	Last *	Max	Min
load-gen-sysbench	98.82%	99.24%	98.23%
pg12	97.19%	98.76%	96.27%
ps-80-source	87.41%	89.17%	72.70%

CPU Anomaly — Last 1 hour

	Last *	Max ⌄
pxc-80-1	-4%	25%
ps-80-source	4%	23%
pxc-80-2	3%	11%

Top 20 CPU Usage (prev week) — Last 1 hour timeshift -1w

	Last *	Max	Min
load-gen-sysbench	99.01%	99.24%	98.20%
pg12	97.81%	99.06%	95.33%
ps-80-source	83.03%	89.38%	66.53%

Top 20 Disk Queue — Last 1 hour

	Mean	Max	Min
ps-80-source	0.46	0.59	0.28
pxc-80-2	0.29	0.44	0.13
pmm-server	0.23	0.37	0.14

Disk Queue Anomaly — Last 1 hour

	Mean	Max	Min
load-gen-sysbench	0.00	0.00	0.00
mariadb-105	0.03	0.09	0.00
mongo-config-1	0.00	0.01	0.00

Top 20 Disk Queue (prev week) — Last 1 hour timeshift -1w

	Mean	Max	Min
pxc-80-2	0.43	1.48	0.07
pmm-server	0.30	0.80	0.15
ps-80-source	0.43	0.68	0.27

Top 20 Write Latency — Last 1 hour

	Mean	Max	Min
pg11	9.08 ms	64.69 ms	648.65 µs
mongo-config-2	2.53 ms	25.84 ms	308.27 µs
pxc-80-3	7.59 ms	22.55 ms	1.52 ms

Write Latency Anomaly — Last 1 hour

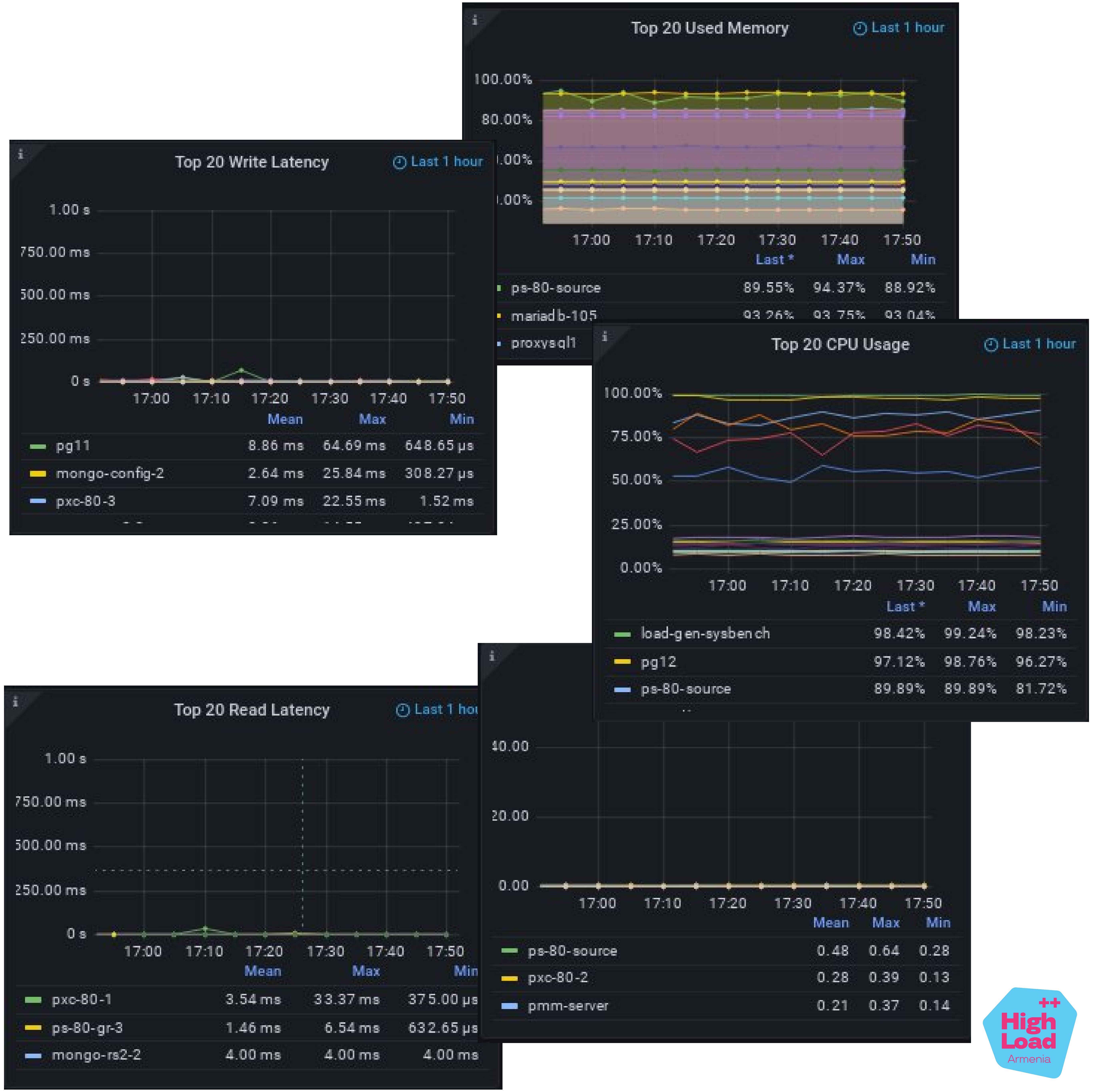
	Mean	Max	Min
pmm-server	1.72 ms	4.21 ms	118.03 µs
mongo-rs2-1	514.04 µs	2.60 ms	4.78 µs
pxc57-3	544.58 µs	1.11 ms	173.05 µs

Top 20 Write Latency (prev week) — Last 1 hour timeshift -1w

	Mean	Max	Min
pg11	6.19 ms	54.55 ms	774.65 µs
pxc57-2	6.17 ms	45.61 ms	529.95 µs
ps-80-gr-3	4.57 ms	33.77 ms	989.42 µs

Command center

- You can quickly check your system
- Metrics from CPU, RAM, Disk
- Top level panels



Top 20 Used Memory

	Last *	Max	Min
ps-80-source	89.55%	94.37%	88.92%
mariadb-105	93.26%	93.75%	93.04%
proxysql1			

Top 20 Write Latency

	Mean	Max	Min
pg11	8.86 ms	64.69 ms	648.65 μs
mongo-config-2	2.64 ms	25.84 ms	308.27 μs
pxc-80-3	7.09 ms	22.55 ms	1.52 ms

Top 20 CPU Usage

	Last *	Max	Min
load-gen-sysbench	98.42%	99.24%	98.23%
pg12	97.12%	98.76%	96.27%
ps-80-source	89.89%	89.89%	81.72%

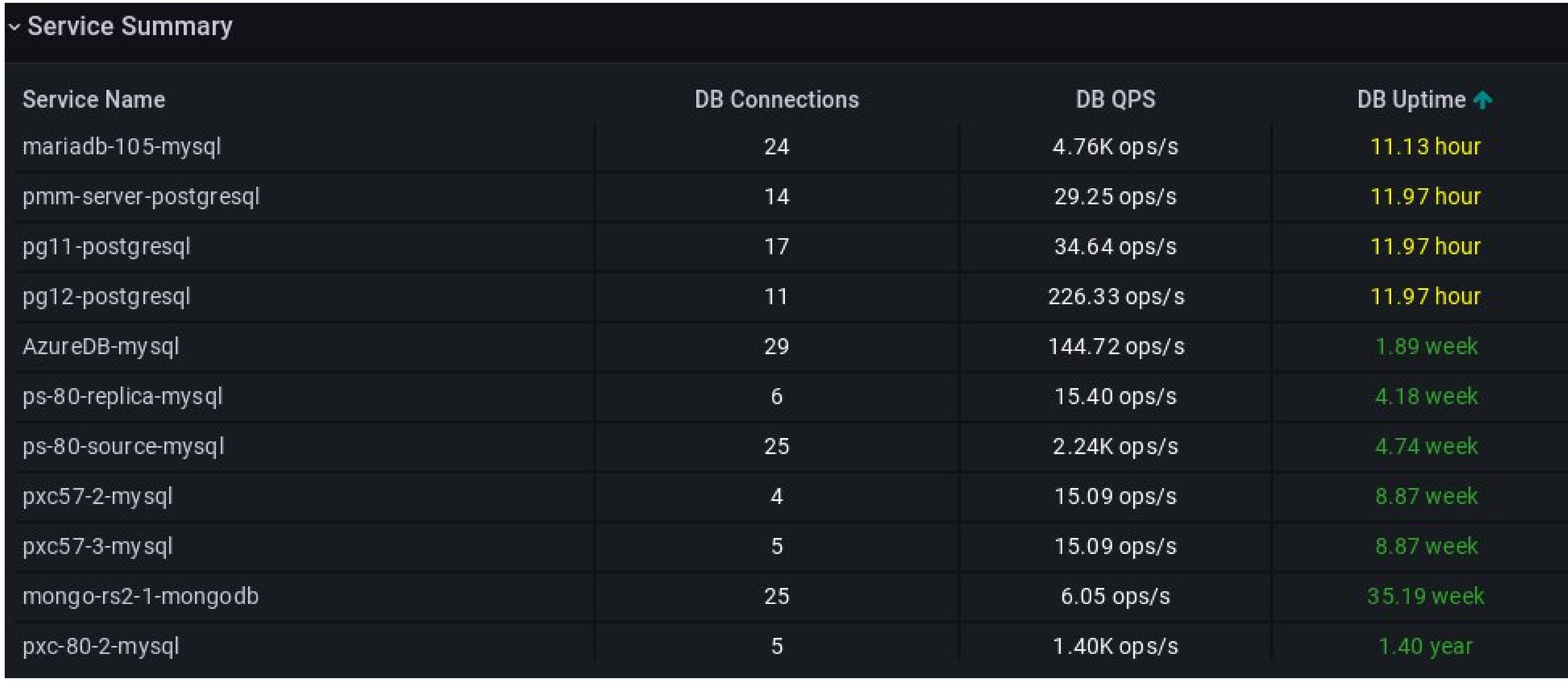
Top 20 Read Latency

	Mean	Max	Min
pxc-80-1	3.54 ms	33.37 ms	375.00 μs
ps-80-gr-3	1.46 ms	6.54 ms	632.65 μs
mongo-rs2-2	4.00 ms	4.00 ms	4.00 ms

	Mean	Max	Min
ps-80-source	0.48	0.64	0.28
pxc-80-2	0.28	0.39	0.13
pmm-server	0.21	0.37	0.14

Service summary

- More detailed level
- How many connections?
- What about QPS?
- What uptime for this instance?

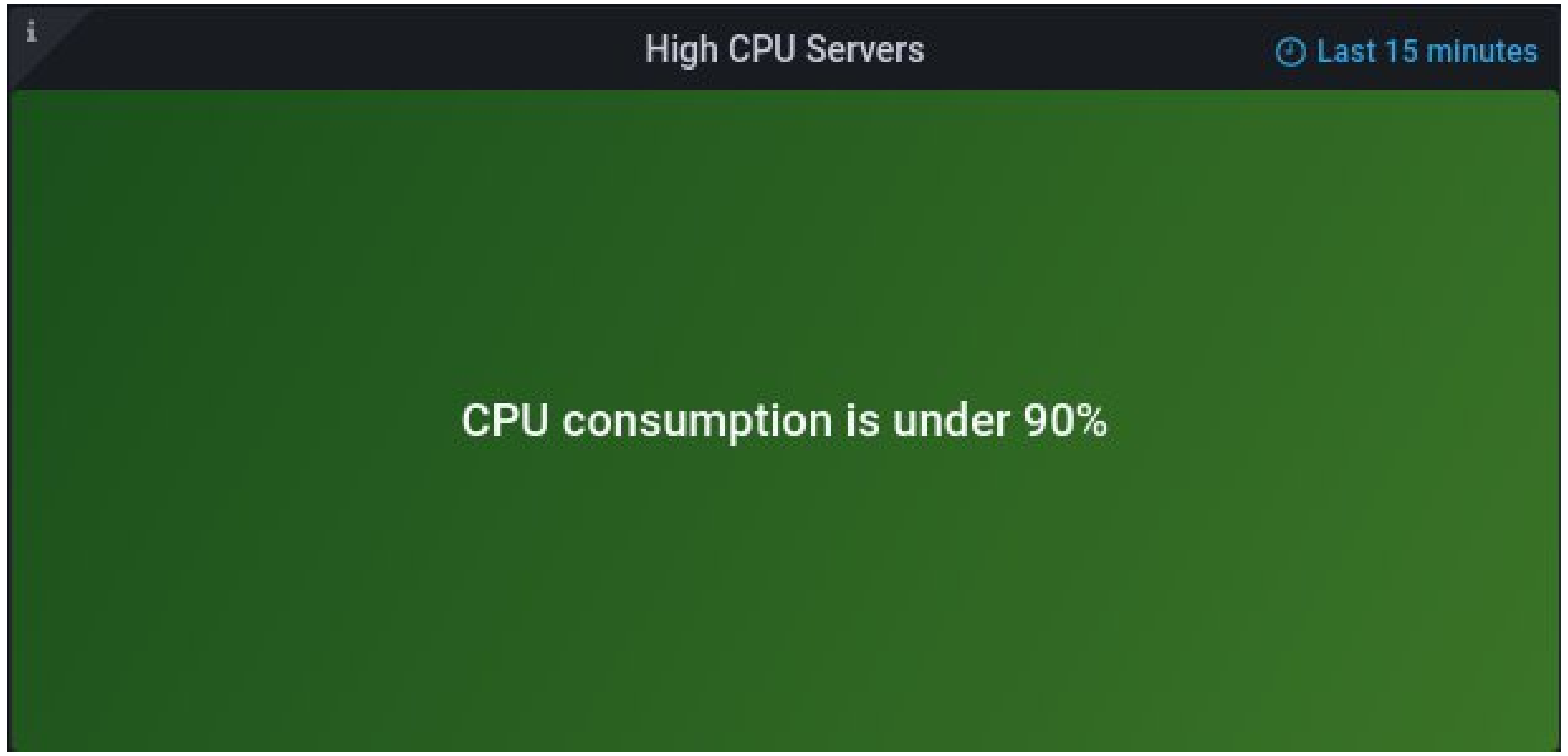


˅ Service Summary

Service Name	DB Connections	DB QPS	DB Uptime ↑
mariadb-105-mysql	24	4.76K ops/s	11.13 hour
pmm-server-postgresql	14	29.25 ops/s	11.97 hour
pg11-postgresql	17	34.64 ops/s	11.97 hour
pg12-postgresql	11	226.33 ops/s	11.97 hour
AzureDB-mysql	29	144.72 ops/s	1.89 week
ps-80-replica-mysql	6	15.40 ops/s	4.18 week
ps-80-source-mysql	25	2.24K ops/s	4.74 week
pxc57-2-mysql	4	15.09 ops/s	8.87 week
pxc57-3-mysql	5	15.09 ops/s	8.87 week
mongo-rs2-1-mongodb	25	6.05 ops/s	35.19 week
pxc-80-2-mysql	5	1.40K ops/s	1.40 year

Descriptions

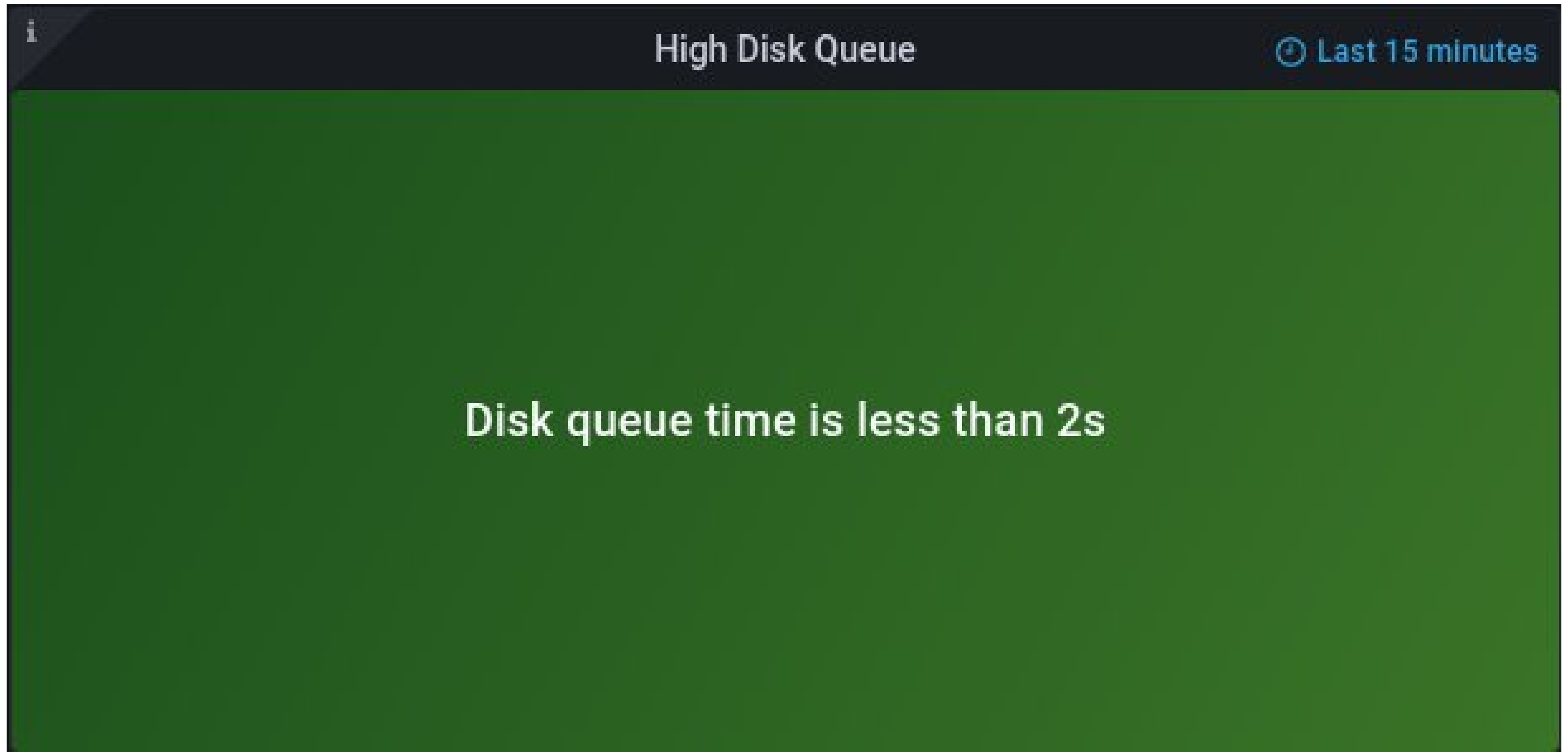
- We need more clear descriptions
- “No anomalies” is not clear
- CPU consumption is under 90%
- Disk queue time is less than 2s



High CPU Servers

Last 15 minutes

CPU consumption is under 90%



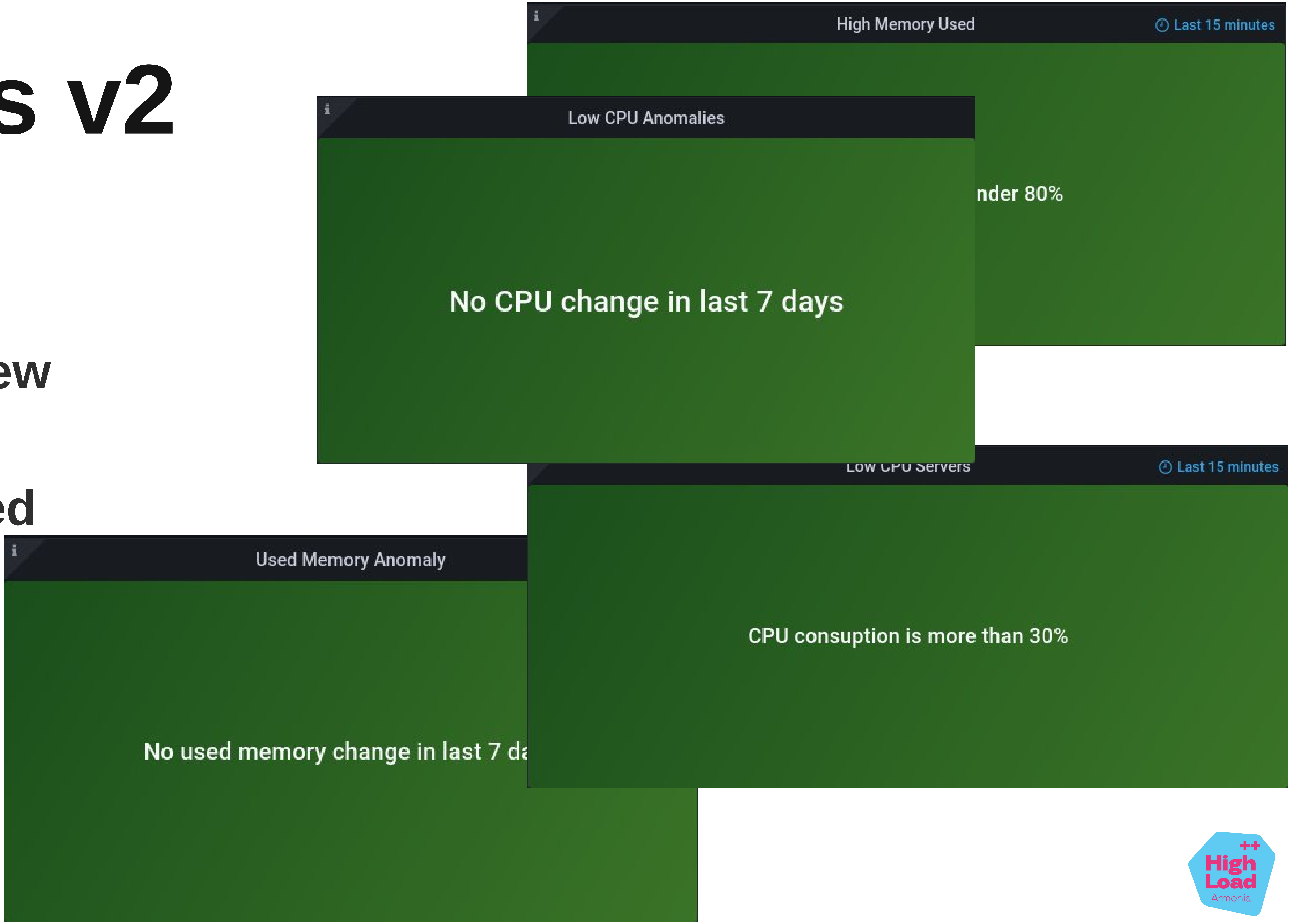
High Disk Queue

Last 15 minutes

Disk queue time is less than 2s

Anomaly Detections v2

- We want more observability!
- Let's add some new metrics
- Low CPU and Used Memory



High Memory Used

Last 15 minutes

nder 80%

Low CPU Anomalies

No CPU change in last 7 days

Low CPU Servers

Last 15 minutes

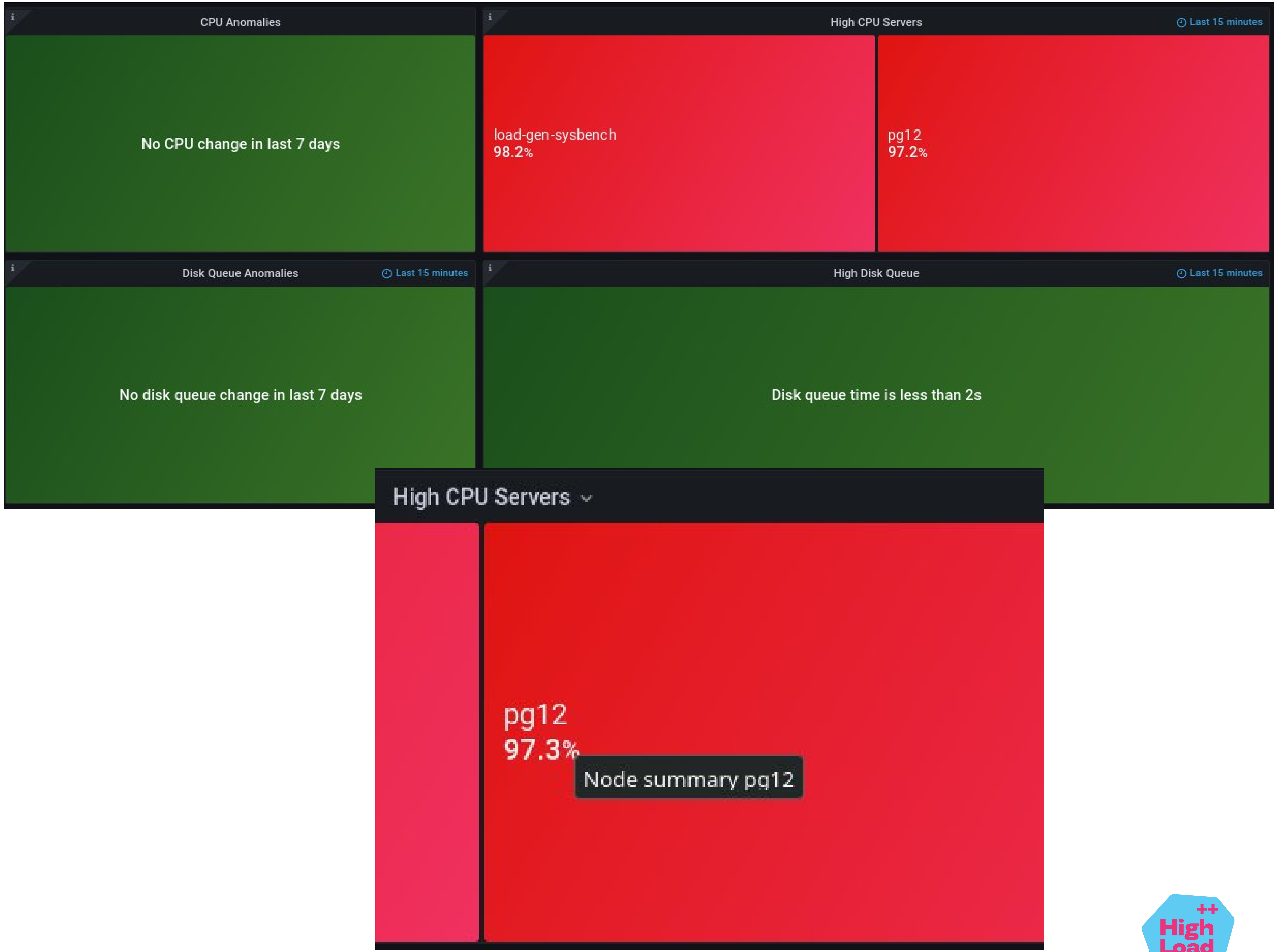
CPU consuption is more than 30%

Used Memory Anomaly

No used memory change in last 7 da

Anomaly Detections v2

- How can we create “story” dashboard?
- Let's drill down
- Jumping to differences dashboards



CPU Anomalies

No CPU change in last 7 days

High CPU Servers — Last 15 minutes

load-gen-sysbench 98.2%

pg12 97.2%

Disk Queue Anomalies — Last 15 minutes

No disk queue change in last 7 days

High Disk Queue — Last 15 minutes

Disk queue time is less than 2s

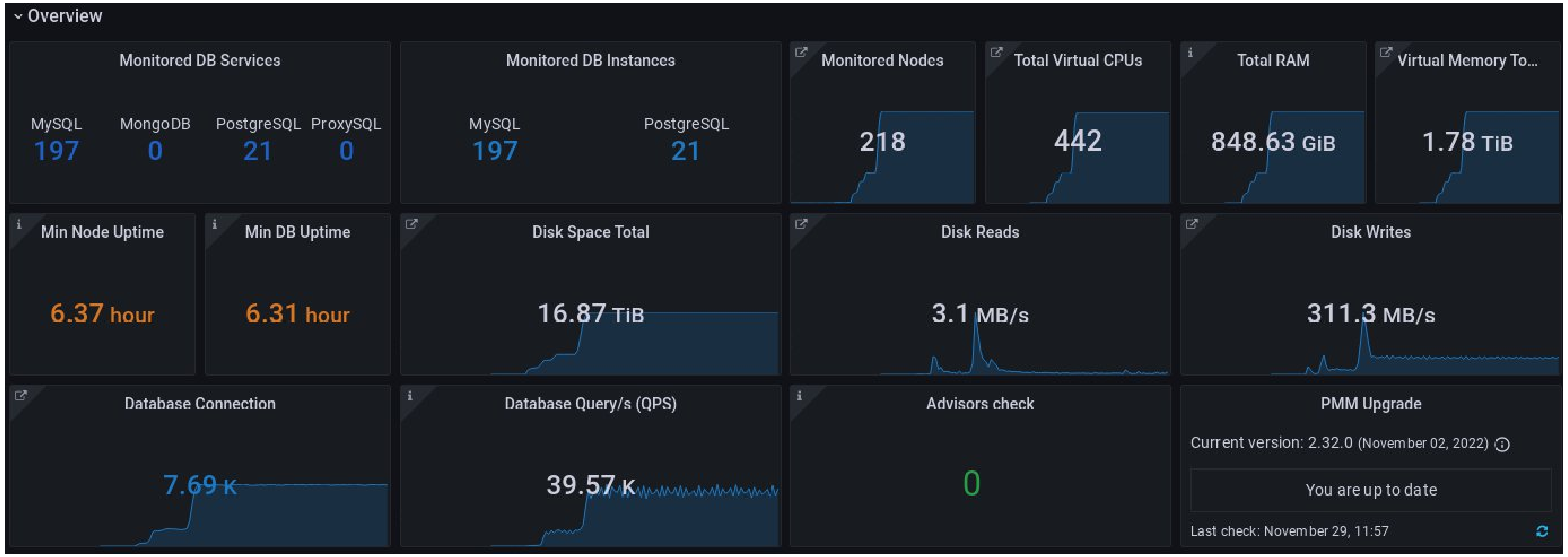
High CPU Servers

pg12 97.3%

Node summary pg12

Overview v2

- Types of databases were added
- Some panels were removed
- Filters were added



⌄ Overview

Monitored DB Services
MySQL 197
MongoDB 0
PostgreSQL 21
ProxySQL 0

Monitored DB Instances
MySQL 197
PostgreSQL 21

Monitored Nodes 218

Total Virtual CPUs 442

Total RAM 848.63 GiB

Virtual Memory To... 1.78 TiB

Min Node Uptime 6.37 hour

Min DB Uptime 6.31 hour

Disk Space Total 16.87 TiB

Disk Reads 3.1 MB/s

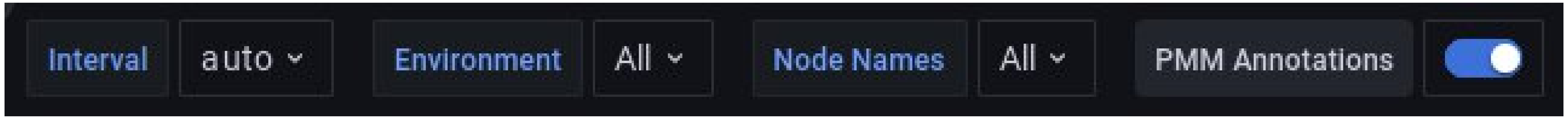
Disk Writes 311.3 MB/s

Database Connection 7.69 K

Database Query/s (QPS) 39.57 K

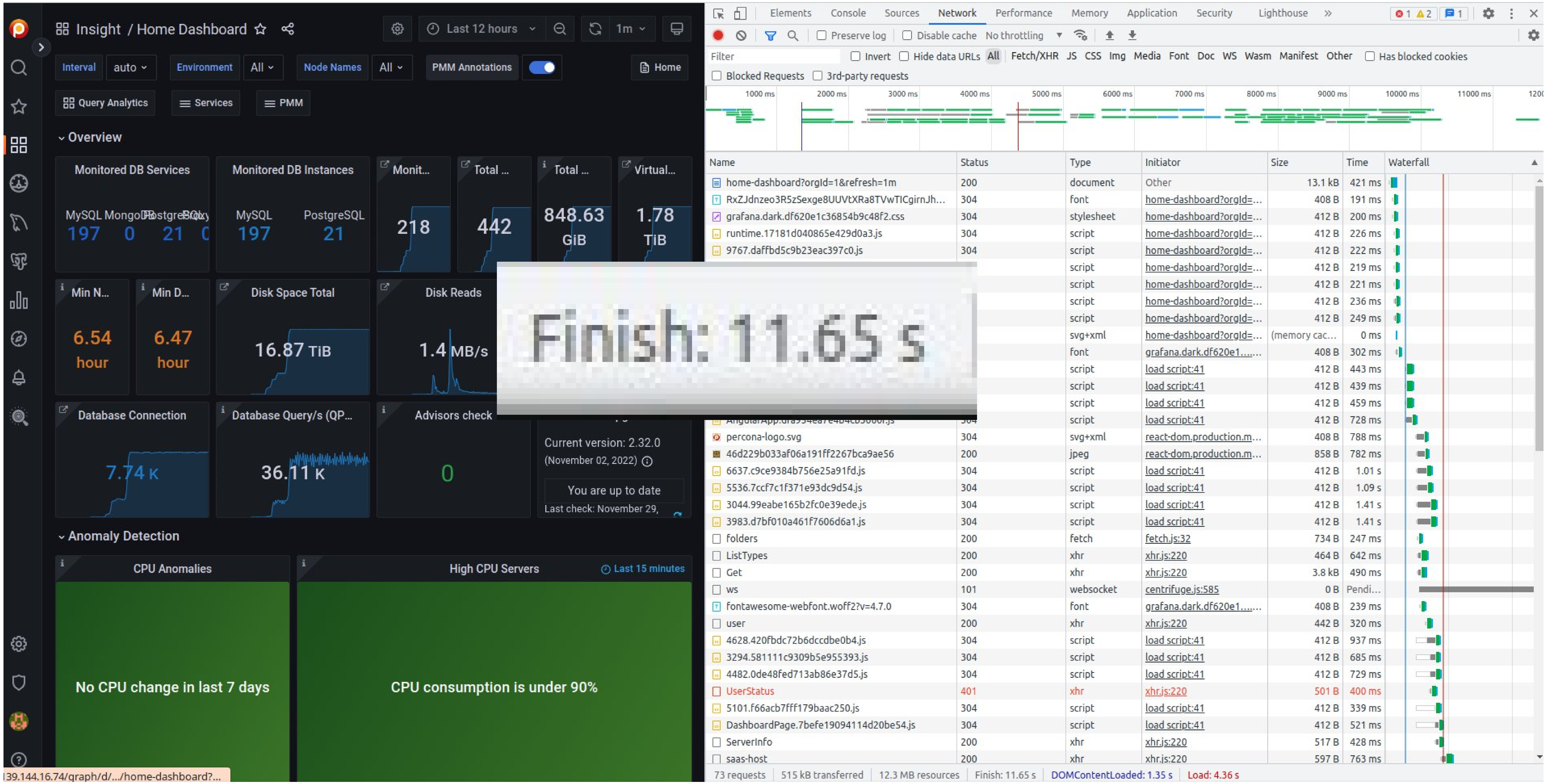
Advisors check 0

PMM Upgrade
Current version: 2.32.0 (November 02, 2022)
You are up to date
Last check: November 29, 11:57



Interval: auto ⌄
Environment: All ⌄
Node Names: All ⌄
PMM Annotations: ●

WIN!?



Finish: 11.65 s

Insight / Home Dashboard

Last 12 hours · 1m

Interval auto · Environment All · Node Names All · PMM Annotations · Home

Query Analytics · Services · PMM

Overview

Panel	Value
Monitored DB Services	MySQL 197, MongoDB 0, PostgreSQL 21, Proxy 0
Monitored DB Instances	MySQL 197, PostgreSQL 21
Monit...	218
Total ...	442
Total ...	848.63 GiB
Virtual...	1.78 TiB
Min N...	6.54 hour
Min D...	6.47 hour
Disk Space Total	16.87 TiB
Disk Reads	1.4 MB/s
Database Connection	7.74 K
Database Query/s (QP...	36.11 K
Advisors check	0

Current version: 2.32.0

(November 02, 2022)

You are up to date

Last check: November 29,

Anomaly Detection

CPU Anomalies

No CPU change in last 7 days

High CPU Servers · Last 15 minutes

CPU consumption is under 90%

139.144.16.74/graph/d/.../home-dashboard?...

Elements · Console · Sources · Network · Performance · Memory · Application · Security · Lighthouse

□ Preserve log · □ Disable cache · No throttling

Filter · □ Invert · □ Hide data URLs · All · Fetch/XHR · JS · CSS · Img · Media · Font · Doc · WS · Wasm · Manifest · Other · □ Has blocked cookies

□ Blocked Requests · □ 3rd-party requests

Name	Status	Type	Initiator	Size	Time
home-dashboard?orgId=1&refresh=1m	200	document	Other	13.1 kB	421 ms
RxZJdnzeo3R5zSexge8UUVtXRa8TVwTICgirnJh...	304	font	home-dashboard?orgId=...	408 B	191 ms
grafana.dark.df620e1c36854b9c48f2.css	304	stylesheet	home-dashboard?orgId=...	412 B	200 ms
runtime.17181d040865e429d0a3.js	304	script	home-dashboard?orgId=...	412 B	226 ms
9767.daffbd5c9b23eac397c0.js	304	script	home-dashboard?orgId=...	412 B	222 ms
		script	home-dashboard?orgId=...	412 B	219 ms
		script	home-dashboard?orgId=...	412 B	221 ms
		script	home-dashboard?orgId=...	412 B	236 ms
		script	home-dashboard?orgId=...	412 B	249 ms
		svg+xml	home-dashboard?orgId=...	(memory cac...	0 ms
		font	grafana.dark.df620e1......	408 B	302 ms
		script	load script:41	412 B	443 ms
		script	load script:41	412 B	439 ms
		script	load script:41	412 B	459 ms
AngularApp.[illegible]	304	script	load script:41	412 B	728 ms
percona-logo.svg	304	svg+xml	react-dom.production.m...	408 B	788 ms
46d229b033af06a191ff2267bca9ae56	200	jpeg	react-dom.production.m...	858 B	782 ms
6637.c9ce9384b756e25a91fd.js	304	script	load script:41	412 B	1.01 s
5536.7ccf7c1f371e93dc9d54.js	304	script	load script:41	412 B	1.09 s
3044.99eabe165b2fc0e39ede.js	304	script	load script:41	412 B	1.41 s
3983.d7bf010a461f7606d6a1.js	304	script	load script:41	412 B	1.41 s
folders	200	fetch	fetch.js:32	734 B	247 ms
ListTypes	200	xhr	xhr.js:220	464 B	642 ms
Get	200	xhr	xhr.js:220	3.8 kB	490 ms
ws	101	websocket	centrifuge.js:585	0 B	Pendi...
fontawesome-webfont.woff2?v=4.7.0	304	font	grafana.dark.df620e1......	408 B	239 ms
user	200	xhr	xhr.js:220	442 B	320 ms
4628.420fbdc72b6dccdbe0b4.js	304	script	load script:41	412 B	937 ms
3294.581111c9309b5e955393.js	304	script	load script:41	412 B	685 ms
4482.0de48fed713ab86e37d5.js	304	script	load script:41	412 B	729 ms
UserStatus	401	xhr	xhr.js:220	501 B	400 ms
5101.f66acb7fff179baac250.js	304	script	load script:41	412 B	339 ms
DashboardPage.7befe19094114d20be54.js	304	script	load script:41	412 B	521 ms
ServerInfo	200	xhr	xhr.js:220	517 B	428 ms
saas-host	200	xhr	xhr.js:220	597 B	763 ms

73 requests | 515 kB transferred | 12.3 MB resources | Finish: 11.65 s | DOMContentLoaded: 1.35 s | Load: 4.36 s

Leave your feedback!

You can rate the talk and give a feedback on what you've liked or what could be improved

я

Home Dashboard demo

++ High Load Armenia

Co-organizer

Yandex